ENGINEERING NEWS-RECORD

August 14, 1941

Steel forms for swimming pool ready to be sunk in lake at New York World's Fair site

Building Kingsbury Ordnance Plant
Swimming Pool Tank Built in a Lake
Keeping Cost on Hired-Out Shovels
Mixing Sand and Clay for Road Bases

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Vol. 127 AUGUST 14, 1941 No. 7

THIS WEEK

• Can you find the superintendents and pick-up trucks on your job? Inter-works communication at the Kingsbury Ordnance Plant, a project covering 13,133 acres, was a major problem. How the difficulty was overcome by use of 36 two-way radios is described with construction features of the $28,000,000 job.

• Building a reinforced-concrete swimming pool in a lake to accommodate 2,800 bathers was not a simple problem. The specially designed steel tank forms required for bottom and outside walls of the diving areas, and wooden forms for bottom slab of the shallow section are described on page 86.

• Both clay and sands that are not suitable for highway work in their natural state can be made stable by proper mixing. A report on latest experiments in mixing clay slurry with sand to produce mixtures comparable to those shown desirable by laboratory test is included in this issue.

• A simple but effective cost system designed to stop losses on power shovel rentals is described in this issue. The author tells when disposal of old equipment should be made, and gives a guide to purchasing new shovels. Profits are shown possible for each shovel based on a flat hourly charge.

THINGS TO COME

• The article from London in this issue on "Buildings under Bombing" provides vivid background for articles to be published in the next two issues, outlining current thinking in this country on bomb-resistant design. The authors, Professors Wessman and Rose of New York University have recently supervised a course on the subject for practicing engineers, and the articles reflect the conclusions that the class discussions brought out.

• The largest hingeless arch span in the world, 950 ft., is being built over the gorge just below Niagara Falls. As falsework was impossible, an elaborate cable system was necessary to support plate girder ribs during construction. This system and other unusual features will be described in the August 28 issue.

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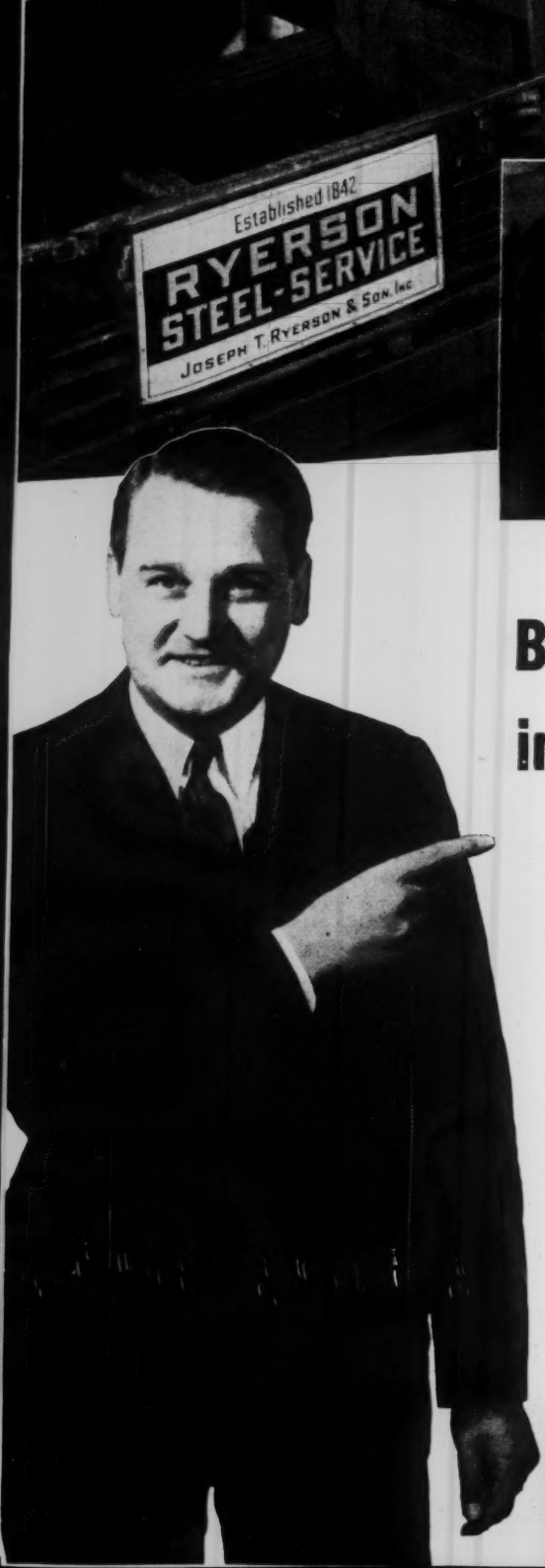

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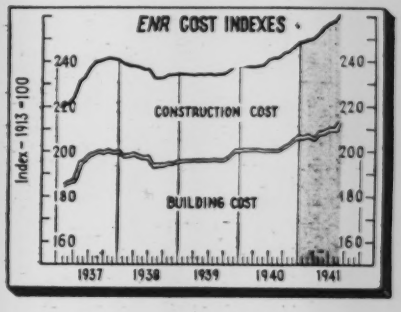
MONTHLY CONSTRUCTION BUSINESS SUMMARY

ENR CONSTRUCTION VOLUME AND NEW CAPITAL . . . . F H A MORTGAGES

(,000 omitted)	July 1940 (4 wk.)	July 1941 (5 wk.)	% Change†	Seven Months 1940 (30 wk.)	Seven Months 1941 (31 wk.)	% Change†
Total Construction	$347,852	$958,663	+120.0	$1,737,488	$3,800,066	+112.0
Private Construction	68,550	86,342	+1.0	552,794	820,760	+44.0
Public Construction	279,302	872,321	+150.0	1,184,674	2,979,306	+143.0
Federal	172,217	743,541	+246.0	387,648	2,171,494	+442.0
Total New Productive Capital	$1,067,271	$1,656,731	+24.0	$1,699,806	$5,007,275	+184.0
Private Investment	98,555	198,171	+57.0	636,937	585,605	−11.0
Federal (non-federal work)	185,144	287,508	+24.0	279,297	354,281	+23.0
Federal (federal work)	783,572	1,176,052	+20.0	783,572	4,067,389	+403.0
FHA Mortgages Selected for Appraisal	$119,692	$133,843*	+12.0	$755,835	$891,657*	+18.0

† *Adjusted for difference in number of weeks.* * *Preliminary.*



CONSTRUCTION COSTS . . . . WAGE RATES . . . . PRICES

	August 1940	August 1941	% Change	Change July to August 1940 Jul.	1940 Aug.	1940 %	1941 Jul.	1941 Aug.	1941 %
ENR Construction Cost Index, 1913 = 100	242.18	260.41	+7.5	242.15	242.18	‡	258.18	260.41	+0.9
ENR Building Cost Index, 1913 = 100	201.71	212.45	+5.3	201.68	201.71	‡	210.22	212.45	+1.1
ENR 20-CITIES AVERAGE									
Common Labor	$0.707	$0.753	+6.5	$0.707	$0.707	0	$0.753	$0.753	0
Skilled Labor (Av. 3 trades)	1.476	1.501	+1.7	1.476	1.476	0	1.501	1.501	0
Bricklayers	1.568	1.595	+1.7	1.568	1.568	0	1.595	1.595	0
Structural Ironworkers	1.535	1.582	+3.1	1.535	1.535	0	1.582	1.582	0
Carpenters	1.330	1.327	−0.2	1.330	1.330	0	1.327	1.327	0
Cement, per bbl.	$2.52	$2.52	0	$2.51	$2.52	+0.4	$2.52	$2.52	0
Reinforcing steel, per cwt.	2.49	2.59	+4.0	2.43	2.49	+2.5	2.60	2.59	−0.4
Struct. steel shapes, base	2.10	2.10	0	2.10	2.10	0	2.10	2.10	0
Sand, per ton	1.17	1.18	+0.9	1.17	1.17	0	1.18	1.18	0
Lumber, 2x4 Fir, per M ft.	34.97	43.05	+23.1	34.88	34.97	+0.3	41.22	43.05	+4.4
Lumber, 2x4 Pine, per M ft.	31.12	39.63	+27.4	31.15	31.12	−0.1	37.37	39.63	+6.1
Brick, common, per M	14.35	14.76	+2.8	14.34	14.35	+0.1	14.81	14.76	−0.3
Ready-mixed concrete, c.y.	6.94	7.07	+1.9	6.94	6.94	0	7.02	7.07	+0.7
Struct. clay tile, 3x12x12	74.49	75.01	+0.7	74.49	74.49	0	74.21	75.01	+1.1
Paving asphalt, cars, ton	14.20	14.60	+2.8	14.16	14.20	+0.3	14.49	14.60	+0.8

‡ *Less than .05 percent change.*

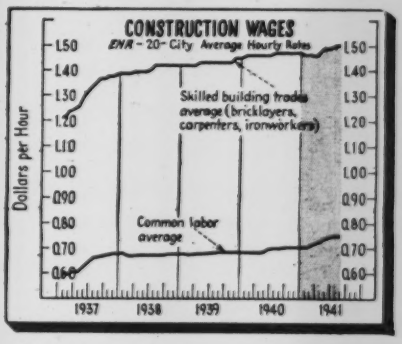
ENR INDEX NUMBERS

Base = 100	Construction Cost 1913	1926	Building Cost '13	'26	Volume '13	'26
Aug., 1941	260.41	125.18	212.45	114.84		
July, 1941	258.18	124.11	210.22	113.64	635	278
June, 1941	256.79	123.44	209.41	113.20	492	216
May, 1941	255.55	122.84	209.24	113.11	275	121
Apr., 1941	252.40	121.33	208.60	112.76	322	141
Mar., 1941	250.71	120.52	207.88	112.37	388	169
Feb., 1941	250.50	120.42	208.42	112.67	374	164
Jan., 1941	249.69	120.03	207.94	112.46	402	176
Dec., 1940	249.12	119.75	208.19	112.54	344	151
Nov., 1940	247.24	118.85	206.24	111.49	331	145
Oct., 1940	245.02	117.78	204.02	110.29	490	215
Sept., 1940	244.13	117.35	203.13	109.83	324	142
Aug., 1940	242.18	116.42	201.71	109.04	281	123
July, 1940	242.15	116.40	201.68	109.02	308	135
1940 (Av.)	241.96	116.31	202.81	109.64	269	118
1939 (Av.)	235.51	113.21	197.44	106.73	211	92
1938 (Av.)	225.86	113.34	196.83	106.40	197	86
1937 (Av.)	234.71	112.66	196.15	106.07	172	75

MATERIAL SHIPMENTS . . . . BUILDING PERMITS

	July 1940	July 1941	% Change	June 1941	% Change June-July
Lumber (% 1935-'39 wk. seas. av.) N. L. M. A.	110.6	129.8	+17.4	129.0	+0.6
Steel (% operating capacity) A. I. S. I.	85.2	97.0	+13.8	99.2	−2.2

	June 1940	June 1941	% Change	Six Months 1940	Six Months 1941	% Change
Fabricated Structural Steel, tons, A. I. S. C.	119,087	184,095	+54.6	655,012	1,055,946	+61.0
Cement, thous. bbl., U. S. B. of M.	13,223	16,109	+21.8	53,774	71,644	+33.3
Building Permits, Dun & Bradstreet (,000 omitted)	$115,028	$135,385	+17.7	$649,706	$757,147	+16.5



RENT INDEX . . . . EMPLOYMENT

	June 1940	June 1941	% Change	May 1941	% Change May-June
Rent (Housing) Index, N. I. C. B.	86.8	88.2	+1.7	88.0	+0.2
Est. Total Employment, thous., N. I. C. B.	46,927	53,120	+13.2	51,761	+2.6
Est. Construction Employment, thous., N. I. C. B.	2,173	3,159	+45.3	2,826	+11.8

ENGINEERING CONSTRUCTION CONTRACTS——ENGINEERING NEWS-RECORD——JULY, 1941

Engineering News-Record *reports projects of the following minimumcosts;—water works, excavation, drainage and irrigation,* $15,000; *other public works,* $25,000; *industrial buildings,* $40,000; *other buildings,* $150,000

Five Weeks—Thousands of Dollars (000) Omitted)

Public Works	New England	Middle Atlantic	South	Mid West	West of Mississippi	Far West	United States July 1941	United States Seven Months 1941	1940	Canada
Waterworks	1,340	2,904	3,360	907	2,370	836	11,717	49,888	47,879	402
Sewerage	24	4,198	377	864	1,422	1,025	7,910	60,383	51,054	107
Bridges, public	822	2,084	2,056	1,455	3,067	677	10,161	71,210	58,734	425
Earthwork and waterways	545	1,594	57,620	2,162	3,057	11,521	76,499	177,601	144,746	107
Streets and roads	4,780	14,551	15,877	9,535	23,956	5,047	73,746	376,545	418,171	949
Buildings, public	7,241	78,141	128,515	43,988	179,182	92,569	529,636	1,693,564	254,157	2,712
Unclassified, public	2,999	22,676	48,231	4,062	57,377	27,307	162,652	550,115	209,933	9,492
Total public	17,751	126,148	256,036	62,973	270,431	138,982	872,321	2,979,306	1,184,674	14,194
Federal government (included in above classifications)	10,294	87,430	236,174	48,866	231,990	128,787	743,541	2,171,494	387,648	.....
Private										
Bridges, private	.....	.....	.....	.....	85	.....	85	5,360	9,755	.....
Buildings, industrial	1,467	9,700	2,949	9,103	5,438	2,461	31,118	335,075	241,975	33,558
Buildings, commercial	2,550	25,485	1,095	2,065	4,200	6,094	41,489	339,991	220,600	310
Unclassified, private	70	1,054	1,950	1,076	2,957	6,543	13,650	140,334	80,464	4,115
Total private	4,087	36,239	5,994	12,244	12,680	15,098	86,342	820,760	552,794	37,981
Total Engineering Construction:										
July, 1941 (5 weeks)	21,838	162,387	262,030	75,217	283,111	154,080	958,663	.....	.....	52,175
June, 1941 (4 weeks)	32,596	101,151	175,748	90,502	132,388	56,836	589,221	.....	.....	33,013
July, 1940 (4 weeks)	43,985	66,470	90,257	55,365	35,984	55,791	347,852	.....	.....	38,142
Seven Months — 1941	186,223	809,457	873,853	611,990	802,816	515,727	.....	3,800,066	.....	155,268
Seven Months — 1940	113,772	420,327	366,075	306,183	314,691	216,420	.....	.....	1,737,468	112,984

Pittsburgh's reconstructed Water Street bridge approach, with traffic segregation on paralleling roadways. Atlas High-Early made possible restoration of streetcar and auto traffic 20 days ahead of schedule. American Bridge Co. fabricated and erected all structural steel. Contractor: American Bridge Co., Pittsburgh, Pa. Subcontractor: Harrison Construction Co., Pittsburgh.

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The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • AUGUST 14, 1941

Defense road bill redrafted to meet President's veto

Senate road leaders draft new legislation to meet objections raised by President. Unallocated fund made available for urgent work on the defense system.

New defense-road legislation was introduced into the Senate this week following failure of the House to override the President's veto of earlier legislation (*ENR*, Aug. 7, p. 185). The Senate voted 57 to 19 to override, but a similar move in the House lost by two votes.

The President's principal objection to the earlier bill was on the ground that the $125,000,000 authorized for expenditure on the strategic highway network was all allocated to the states using the regular federal-aid formula set up in the 1916 act instead of placing responsibility for the allocation in the hands of the Administration to be used where defense needs were most urgent. The President also objected to the amount, stating that $25,000,000 would be adequate to meet urgent needs, chiefly strengthening bridges and some road widening in key military areas.

President's objection met

The new bill meets the President's objections in part by setting up a revolving fund of $25,000,000 to be used by the Public Roads Administration to aid states in financing costly operations on the strategic network. The remainder of the $125,000,000 for the network in the vetoed bill is again included to be apportioned to the states on the regular federal-aid basis but states need only match this money on a 75 percent federal-25 percent state basis.

The authorization for expenditure of federal funds for off-street parking to which the President objected is eliminated as is the provision for recall of PRA employees. The number of PRA employees who can be sent to technical schools is limited to ten per year.

The amount for access roads is cut from $150,000,000 to $100,000,000, the President's original estimate. Retained are the items of $10,000,000 each for flight strips along highways and for advance planning. States are authorized to submit claims for road damage due to army maneuvers, to the Public Roads Administration. The vetoed bill authorized the use of federal funds to reimburse states for such damage.

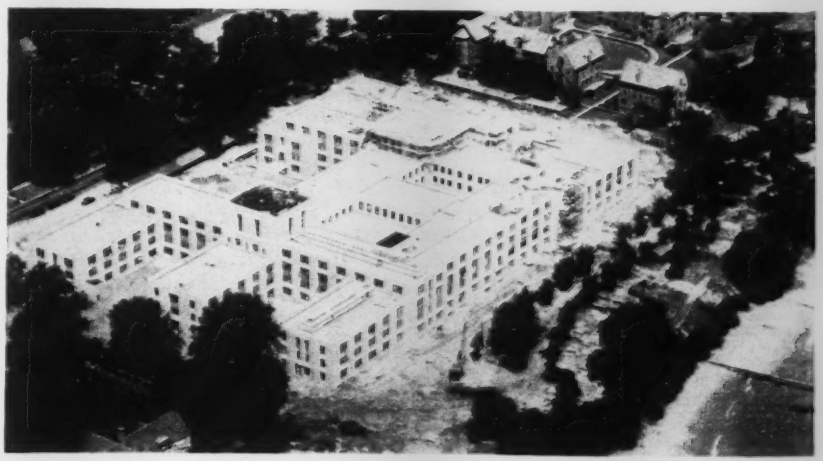
Early action by the House is not expected as the House may recess soon until after Labor Day.

Steel priorities hold up Penn. road program

Nearly $35,000,000 worth of road and bridge construction work in Pennsylvania is being delayed due to difficulties in obtaining materials and transportation, it is reported by Thomas C. Frame, chief engineer of the Pennsylvania Department of Highways.

Inability to obtain steel, said Mr. Frame, "is our principal trouble. However, almost every other material might be included." For example, "We have been hampered considerably by the scarcity of railroad cars to handle bulk cement."

Efforts to get priority rating on materials needed to put the Commonwealth's roads in first class shape have so far failed to be productive.



Chicago Aerial Survey Photo

New $5,000,000 structure for Northwestern Tech

Damage caused by the disastrous fire last Dec. 2 in the form work and canvas covering on the new $5,000,000 reinforced-concrete home for Northwestern Technological Institute at Evanston, Ill. has all been repaired and the big structure is nearing completion. Much of the interior concrete and some of the exterior walls had to be replaced. Original completion dates were Sept. 15, 1941 for the south half, and Nov. 1 for the north half.

The accompanying air view, looking northwest, shows the building as it is today, with the shell largely rebuilt and complete. The near wings at the center and left, to house the physics and chemical engineering departments are now complete. The near and far corner wings, for chemistry and civil engineering departments, will be ready for school opening Sept. 15.

The structure, three and four stories high, with a frontage of 600 ft. and a depth of 400 ft., is being built by R. C. Wieboldt Co., Chicago contractors. Holabird & Root, Chicago, are architects. Prof. G. A. Maney is chairman of the department of civil engineering, Northwestern Technological Institute.

New construction for year placed at ten billions

Expenditure of $10,200,000,000 in the United States for new construction is the total estimated by the U. S. Department of Commerce for 1941. An increase of 49 percent over last year, this gain will result from a large volume of private work on top of the heavy defense construction program. The Commerce Department estimate is close to *Engineering News-Record's* most recent estimated total for 1941 of $11,300,000,000, though the percentage of gain over 1940 is less in the *ENR* estimate, only 33 percent.

Construction activity in the second half is expected to exceed the high rate of the first half, according to the Commerce department, which anticipates a shortage of construction materials, particularly metals before the end of 1941 and certainly in 1942. Because of priorities this will tend, it says, to concentrate construction activity on defense, including defense housing.

The total for 1941 estimated by the Commerce department includes $3,000,000,000, for national defense compared with $600,000,000 in 1940. Direct military and naval construction expenditures at $1,700,000,000 and new industrial plant at $1,500,000,000 are included in the estimated total. Non-farm residential construction is estimated at $2,900,000,000 of which 20 percent is government owned.

• • •

Insurance rating plan lowers construction cost

The War Department has announced 42 percent savings on first-quarter operation costs of its new Comprehensive Rating Plan for insurance on government construction work on cost-plus-fixed-fee contracts. The new plan covers all work where the premium is in excess of $5,000, and thus includes a large percentage of government construction.

The new plan permits the selection of the carrier by the contractor and provides for payment to the carrier of administrative costs, adjusting claims, etc., and for reimbursement to the carrier for claims or losses. Thus the government partially carries its own insurance but there is a provision that the maximum premium paid shall not exceed 90 percent of the standard premium for workmen's compensation or 50 percent of the standard premium for other forms of coverage.

Workmen's compensation is by far the largest item in the insurance, other coverages being limited to public and protective (subcontractor's) liability and property damage. Fire, windstorm, etc., insurance are not carried.

Insurance was formerly placed by the contractor after asking bids from not less than two stock and two mutual insurance companies. In cases where costs are excessive on projects antedating the new plan, the War Department has studied the conditions and conducted negotiations, in which the carriers are said to be cooperating wholeheartedly, to reduce the cost of insurance.

PRIORITIES GUIDEPOST

Current notes on what, who and how

ON AUG. 11, STEEL IN ALL FORMS, including alloy products, was placed under full priority control. Defense orders must be accepted by steel companies, subject to certain exceptions, even if this acceptance means the deferment of non-defense orders or orders with lower ratings. Only after filling all defense orders will deliveries on non-defense orders be made. Beginning Sept. 1, purchase orders for steel must be accompanied by special form PD-73, which is obtainable from steel producing companies, setting forth the purposes for which the ordered material will be used.

Another restriction is that a producer must file monthly reports with the division of priorities, showing orders received, shipments made during the month and unfilled orders at the month's end. Likewise the new restrictions contain provisions designed to prevent the building up of excess inventories.

If defense orders are rejected or unnecessarily delayed the customer may bring this to the attention of the priorities division.

The builder of a new plant to get steel deliveries should either (1) apply to the priorities division of OPM for a preference rating for all steel desired by filling out application PD-1 or (2) write Ward Freeman of the same office for a project rating. With the latter method the application should give sufficient details for an engineering picture of the project planned.

THE ORDERS by the Office of Production Management to put steel, pig iron, and silk among the materials under industry-wide mandatory control bring the total number of materials on the priorities list to twenty, as of Aug. 11. The twenty are as follows: aluminum, magnesium, nickel, nickel-steel, ferro-tungsten, tungsten high-speed steel, machine tools, synthetic rubber, copper, cork, borax, polyvinyl chloride, zinc, rubber, chromium, pig iron, steel, silk, cutting tools, and calcium silicon.

Next major group of materials expected to be put under similar control are the chemicals, but control of many others can be expected.

OPM asks for increase in Bessemer steel capacity

In an effort to maintain and increase steel production in the face of a shortage of iron and steel scrap at many mills, the Office of Production Management Aug. 6 asked several steel companies to submit proposals for expanding wherever practicable their capacity to produce Bessemer ingots, which require very little scrap. Also companies now operating blast furnaces where pig iron is made and open hearth furnaces in which pig iron and scrap are converted into steel were told to submit proposals for construction of any warranted Bessemer converters, since this allows steel to be made from pig iron with the addition of a minimum of scrap.

These same companies were requested to list products now made of open hearth steel that could suitably be made of Bessemer steel; a few such products are wire, light structural material, reinforcing, pipe, certain grades of tinplate and some ship plates.

If necessary, Bessemer converters can turn out "artificial" scrap for use in open hearth furnaces. In addition, Bessemer converters sometimes are used in the duplexing process, in which steel is made partly in a Bessemer converter and then transferred to an open hearth furnace to complete the process. Open hearth furnaces can produce duplex steel faster than they can turn out straight open hearth steel; use of the duplex process therefore increases their capacity.

A first step toward increasing Bessemer capacity was taken by the Office of Production Management on July 23, when it recommended an initial expansion of 6,508,950 tons in annual pig iron capacity. This program included construction of two new Bessemer converters, with an annual steel capacity of 600,000 tons, at the Edgar Thomson works of the Carnegie-Illinois Steel Corp.

It is expected that construction of additional Bessemer capacity will require 12 months.

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PWA approves loan to Grand River Authority

Governor Leon C. Phillips of Oklahoma has announced plans to reorganize the Grand River Dam Authority, following approval by PWA of an additional loan amounting to $2,363,636.

K. S. Wingfield, director of the PWA power division, has disclosed, however, that the allotment was conditioned on a court decision upholding the GRDA's right to issue more bonds under the state's new budget-balancing amendment.

The money will be used for a new generator unit and for transmission lines to the Tulsa and Tri-State mining area.

Essential services get OPM rating for maintenance and repair work

Federal, state and municipal public work, public utilities, transportation agencies and plants of basic industries will receive preference in meeting maintenance needs.

To assure a steady flow of maintenance and repair parts to public services, such as water supply and sewage disposal, to public utilities, to transportation agencies and to essential industries, the priorities division of the Office of Production Management, Aug. 8, made available a new maintenance and repairs rating plan for more than 150,000 agencies of nine industrial classifications. These organizations are granted the use of an A-10 rating which is expected to help greatly in obtaining necessary material and equipment for repairs and maintenance. The approved groups, which will be greatly increased by adding more public-service and industrial classifications in the near future, include the following:

Federal, state, county and municipal services such as, water supply, sewage disposal, power, gas, police and fire; public utilities; railroads, street railways and bus lines, commercial air lines; mines, metal manufacturing plants and manufacturers of explosives. Highway departments, park, public building, and public institutions are not yet included but will be added soon. The announcement is contradictory with respect to inclusion of city transit agencies, but all will be in ultimately.

The rating is not automatically available to any organization in the above classifications but only becomes effective when application is made by means of forms PD-67, which may be obtained from the Maintenance and Repair Section, Priorities Division, 462 Indiana Ave., Washington, D. C., or from one of the priorities division's field offices.

When an application is granted, the approved firm or agency receives an authenticated order P-22-a bearing a serial number. The rating can then be applied by ordering from the supplier with the serial number added on his order.

In addition a special emergency rating may be assigned to any one of the above classifications. This means that speed in getting repairs for water supplies, power facilities, and other services where time is an important factor will be possible by applying for the telegraphic application A-1-a which must be granted before use of such a rating is possible.

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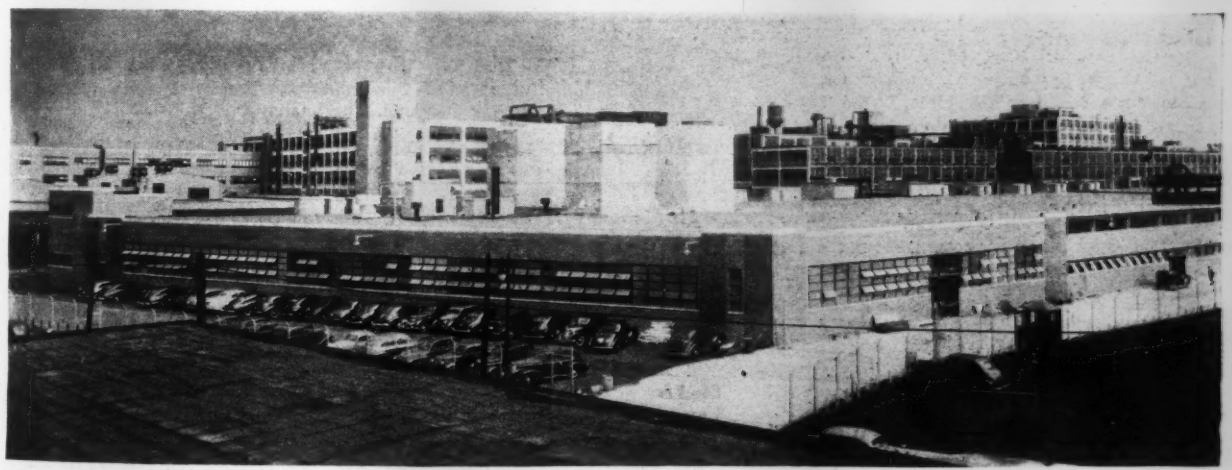
W. S. Kinnear dies; Detroit tunnel builder

Wilson S. Kinnear, retired railroad and tunnel builder, died at Grosse Pointe, Mich., on Aug. 8, age 77. Mr. Kinnear retired from active engineering work in 1936.

W. S. Kinnear is best known for his pioneering work as chief engineer and manager of the Detroit River Tunnel Co. during the construction of the Michigan Central R.R. tunnels under the Detroit River, 1906-1910. Graduated from the University of Kansas in 1884, he spent six years on railroad construction in the Middle West and South America before joining the staff of the Michigan Central in 1890 as an assistant engineer, ultimately becoming chief engineer and assistant general manager. When a decision was made to bring the Michigan Central tracks into Detroit by a tunnel under the river he was made chief engineer and manager of the company set up to do the work and was named with Wm. J. Wilgus and H. A. Carson to an advisory board to decide on the type of tunnel. Finally adopted for the river crossing was a method proposed by Mr. Wilgus. Twin steel tubes, 262 ft. long, bulkheaded off and surrounded by a much larger sheathed shell were sunk in a trench dug across the river, the shells were filled with tremie concrete, and when the whole had been laid the tubes were unwatered and lined with concrete. Mr. Carson had used a similar procedure for a small sewer tunnel at Boston. Mr. Kinnear with the contractors, Butler Bros., Hoff Co., handled construction details.

Following completion of the Detroit work Mr. Kinnear was president of the Kansas City Terminal Ry. Co., later becoming senior partner in W. S. Kinnear & Co., consulting engineers, New York.



Packard dedicates its new Rolls-Royce plane engine plant

On Aug. 2, the Packard Motor Car Co. celebrated completion of the first Rolls-Royce Merlin airplane engine in its contract to furnish 6,000 of these liquid-cooled power units to Britain and 3,000 to the U. S. Army Air Corps. The ceremonies also applied to the necessary new factory units, modern buildings erected on some of the last vacant land in this 40 year old motor car plant in Detroit. The buildings are as modern as the engines that they will turn out and are to be the subject of an article in the Sept. 11 issue of Engineering News-Record. The test building is shown in the foreground above while the assembly building with its four-story office wing is in the left background. The new one story buildings contrast sharply with the multi-story buildings in the rest of the plant.

Federal specifications for cement changed

Six specifications for cements purchased by the federal government are to become effective in November with two major changes over the older requirements. These are: (1) making a 2-in. cube the preferred specification for determining tensile strength, and (2) requiring the autoclaving of 1x1x10-in. neat cement bars as the test for soundness. The latter test will be conducted in steam at a gage pressure of 295 psi. for 3 hr., acceptability of the cement being manifest by an increase in length not greater than 0.05 percent.

In the older specifications the tensile strength of briquettes and the compression test of 2-in. cubes were alternate options with the briquette test preferred. Likewise with the old requirements the soundness was determined by steaming of neat cement pats, at best an uncertain test.

In addition the new specification (SS-C-1916) for normal portland cement has a more rigid requirement for fineness in that a specific surface of 1,600 sq. cm. per gram is now being required, which is an increase from 1,500 sq. cm. per gram.

The new specifications were prepared by the committee on cement, lime and plaster of the federal specifications executive committee, Procurement Division, U. S. Treasury Department. P. H. Bates, chief of the clay and silicate products division of the National Bureau of Standards, is chairman of the committee.

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Pan-American Highway Congress meets Sept. 15-24

The organizing committee of the Fourth Pan-American Highway Congress, to be held in Mexico City, September 15-24, has arranged a most interesting and instructive program from the standpoint of technical sessions. Among the subjects of vital importance to highway engineers, contractors and state highway officials are: Finance, administration, construction and maintenance, with special emphasis on the completion of the Pan-American Highway.

In addition to the Congress, there will be an exposition of road-building machinery and equipment. The Congress and exposition will give American highway officials and engineers an opportunity to meet Latin-American highway officials and learn at first hand what is being accomplished in these countries in the field of highway engineering and administration.

In keeping with Mexican tradition, many unique and highly entertaining features have been included in the program for the visiting delegates.

JOBS OF THE WEEK

WAREHOUSES, SHEDS, UTILITIES, Atlanta, Ga.
Central Contracting Co., Atlanta, Ga. and Beckham & Brooks, of Perry, Ga., have been awarded a contract by the Construction Quartermaster, Atlanta, for warehouses, sheds, and utilities at the Atlanta Construction Quartermaster Depot. Robert & Co. of Atlanta, Ga., are engineers. Estimated cost is $10,750,000.

ANDERSON RANCH DAM, Idaho
Morrison-Knudsen Co., Boise, Idaho, J. F. Shea Co., Ford Twaits and Winston Brothers, Los Angeles, have been awarded contract to build Anderson Ranch Dam, an earth fill project on South Fork of Boise River. Estimated cost is $9,986,203.

CENTRAL ORDNANCE REGULATING STATION, Momence, Ill.
Henry Ericsson Co., Chicago, Ill., will construct central ordnance regulation station, for War Department. The project includes warehouses, magazines, twenty miles of roads, twenty-five-mile railway line, miscellaneous buildings and utilities. The cost is $4,884,029. Nimmons, Carr & Wright, Chicago, Ill., are engineers.

DIRIGIBLE BASE, South Weymouth, Mass.
Barletta Construction Co. and Sawyer Construction Co., Boston, Mass., have been awarded contract by the Bureau of Yards & Docks, Navy Department, Washington, D. C. $5,620,000.

AMMUNITION DEPOT, Hingham, Mass.
T. Stuart & Sons Co., Watertown, N. Y., will construct expansion facilities at Naval ammunition depot for Bureau of Yards & Docks, Navy Department, Washington, D. C. $2,600,000.

DEFENSE HOUSING, Pittsburgh, Pa.
The Allegheny County Housing Authority, Pittsburgh, Pa., received bids for constructing defense housing for 1,000 families. Starrett Bros. Inc. of Chicago, was low bidder at $3,894,983. The project known as the Glen Hazel Heights defense housing, will be built under the supervision of FWA. Hill, Heckler, Hoover & Kohank of Pittsburgh are engineers.

REPLACEMENT CENTER FOR ARMY MEDICAL CORPS, Camp Barkeley, Texas.
The A. J. Rife Construction Co. of Dallas, Texas, has been awarded a contract for the construction of a replacement center for Army Medical Corps, including 170 buildings and utilities for officers and enlisted men, by the War Department. The amount of the contract is $2,036,972.

HOUSING AT NAVY YARD, Long Beach, Calif.
The Bureau of Yards & Docks, Navy Department, Washington, D. C., has awarded a contract to the McNeil Construction Co. of Los Angeles, Calif., for 300 additional duplex dwellings to house enlisted personnel at the Navy Yard. Estimated cost is $2,000,000.

TUBE MILL, Baltimore, Md.
James Stewart & Co., New York, N. Y., has been awarded a contract by the Revere Brass & Copper Co., New York, N. Y., for the construction of a tube mill at Baltimore, Md. Project being financed by the Defense Plant Corp. and will cost $1,396,000 for building and land. The total cost is $3,100,000.

ARMOR-PIERCING CORE PLANT, St. Louis, Mo.
The War Department has awarded construction contract for an armor-piercing core plant at Bircher and Goodfellow Boulevards to Fruin-Colnon Contracting Co. of St. Louis to cost $1,725,000. The cost with equipment will be $6,141,000.

CHEMICAL WARFARE BUILDING, Edgewood, Md.
Cummins Construction Co., Baltimore, Md., will build technical office building for chemical warfare at Edgewood Arsenal for Construction Quartermaster. The cost is $1,500,000.

FLOOD CONTROL, Portsmouth, Ohio.
Minneapolis Dredging Co., Minneapolis, Minn., has been awarded contract for flood control work along the Ohio River from Porstmouth to New Boston, by U.S. Engineers, Cincinnati, O. Estimated cost $1,112,400.

RELOCATING RAILROAD TRACKS, Missouri.
Peter Kiewit Sons Co., Omaha, Neb., has been awarded contract for relocating sixteen miles Chicago, Rock Island & Pacific Ry. Co., between Mercer and Mills Grove, Mo., by War Department. The cost is estimated at $1,000,000.

DEFENSE HOUSING, Stratford, Conn.
Wilaka Construction Co., New York, N. Y., has been awarded contract by the Federal Works Agency, Washington, D. C., for the construction of 400 units for National Defense Housing on Stony Brook Road, at $1,465,000. B. S. Gruzen, Jersey City, N. J., is the architect.

NOTE—Additional bidding and contract news on over 800 projects large and small appear in the Construction News section beginning on page 143.

Longest pipeline in world may soon reach construction stage

Plans submitted by 11 oil companies provides for an 1,820 mile, privately financed pipeline from southwest to eastern seaboard, with a capacity of 250,000 bbl. daily.

Plans for a 1,820-mile pipeline system to convey crude oil from Texas and midwest fields to refineries in the Philadelphia-New York area were submitted to Interior Secretary Ickes on Aug 11 by a group of 11 oil companies who would participate jointly in its construction.

Under discussion for some time, the pipeline project is said to have Ickes' approval and could be gotten underway as soon as President Roosevelt issued a proclamation declaring that the proposed pipeline is essential for national defense. The proclamation also would set forth terms and conditions under which the pipeline is to be constructed and operated, and grant corporations the right to exercise eminent domain privileges in accordance with the recently enacted Cole Pipe Line Act.

Two corporations formed

Two corporations would be created to finance, build and operate the pipeline, according to the proposed plan. National Defense Pipelines, Inc., an $80,000,000 privately financed corporation, would construct: (1) a 22-in. line from Shreveport, La. to Salem, Ill. (2) a 16-in. line from Salem to Wood River, Ill. and (3) a 24-in. line from the junction of the first two lines to the eastern seaboard. This pipe system would have a delivery capacity of 250,000 bbl. daily.

Emergency Pipelines, Inc., a corporation whose capitalization is not disclosed, would construct a 22-in. line from East Texas oil fields to a point near Shreveport, La.

It is reliably reported that survey parties already are in the field and aerial mapping of the proposed route is well underway.

Other defense pipeline projects now underway include the 236-mile Portland-Montreal crude oil line (*ENR* July 31, 1941, p. 145); a refined products line from St. Joe, Fla. to Chattanooga, Tenn. and the 1,000-mile gasoline carrier extending from Baton Rouge, La., to Greensboro, N. C., with intermediate spur lines.

Elizabeth, N. J. ordered to cease harbor pollution

Following a public hearing, held earlier in the summer, the Interstate Sanitation Commission on Aug. 4 ordered the city of Elizabeth, N. J., to stop pollution of the Arthur Kill and other waters of the New York metropolitan area.

Elizabeth is ordered to cease and desist dumping some 6.5 mgd. of untreated sewage through the present outlet into the Arthur Kill on or before Sept. 1, 1941 and an additional 5.3 mgd. by Sept. 1, 1943.

Testimony by the Elizabeth officials disclosed that the city can comply with the first part of the Commission order in less than a week and at an annual cost to the taxpayers of approximately $20,000. Some time will be required to permit compliance with the second half of the Commission ruling as it will mean construction of intercepting sewers and a disposal plant.

St. Lawrence seaway in rivers and harbors bill

The St. Lawrence power and navigation project and the Florida ship canal were added to the rivers and harbors bill by the House rivers and harbors committee on Aug. 8. On the same day Chairman Mansfield of the committee revealed that he had received a request from the President to include the St. Lawrence project in the bill. Speaking of the priority to be given projects included in the bill, the President said, "Some of the projects, notably the St. Lawrence, are needed immediately. Others will serve in the post-war period. There is no reason why both groups should not be included in the present bill with the understanding that when it comes to appropriations the defense needs will be controlling."

The bill is not expected to be ready to be considered by the House until late in September. Before the St. Lawrence and Florida projects were added the projects totaled nearly $300,000,000.

Core drilling underway at TVA's Chatuge Dam site

Preliminary work has been started on Chatuge Dam, to be located on the Hiwassee River near Hayesville, N. C., as workmen begin foundation explorations. Chatuge Dam is one of four such projects to be built in the Southeast under a $40,000,000 grant from Congress for TVA to boost power production needed for national defense.

Although no power is to be provided at Chatuge, about 200,000 acre-ft. of water will be stored from a 190 sq.mi. drainage area. The water will be available for power at all down-river structures. The dam will be of earth and rockfill construction, about 150 ft. high, and built at an estimated cost of $5,000,000.

The axis of the dam will be approximately where the foot bridge crosses the river at left in the illustration. The white board in the center marks the crest elevation.

OBITUARY

ROBERT C. FARRINGTON, 59, chief mechanical engineer since 1919 of The Austin Co., engineers and builders, died at Fort Worth, Tex., July 15. He was a specialist in light control and atmospheric conditions in windowless factories, and established a basic pattern which is now being followed in scores of "blackout" and other defense plants.

GEORGE H. LORING, 62, formerly chief engineer of the Marlboro (Mass.) water department and lately an engineer at Westboro, Mass., died at Boston Aug. 4.

TED C. MAYO, chief sanitary engineer of the Panama Canal Zone, died Aug. 1 at Balboa. Mr. Mayo, a native of Vermont and a civil engineering graduate of Massachusetts Institute of Technology, up until 18 months ago had been connected with the PWA office at Fort Worth, Tex., for five years.

STEWART HERBERT PEPLER, engineer in the Canal Services of the Department of Transport, Ottawa, Ont., died Aug. 4 at Ottawa.

GEORGE T. MACNAB, 75, retired civil engineer, died Aug. 1 at New York, N. Y.

WARD W. SLAWSON, 52, acting assistant to chief city engineer James W. Costello, Newark, N. J., died Aug. 6 at Newark.

BENJAMIN DAVIES, 69, civil engineer, in the engineering department of Cleveland for 27 years, died Aug. 6 at Cleveland, Ohio.

HENRY RYON, 59, retired civil engineer, died July 31 at Albany, N. Y.

WARREN M. BICKNELL, 73, well known construction engineer, died Aug. 6 at Shaker Heights, Ohio. Mr. Bicknell was chairman of the board of the Cleveland Construction Co., Cleveland, Ohio.

BENJAMIN A. KEENEY, 60, civil engineer, died Aug. 5 at Buffalo, N. Y. He had been an engineer and inspector since 1935 on dredges and drill boats in Buffalo harbor.

CONTRACTS AND CAPITAL

ENGINEERING CONSTRUCTION awards for the week total $91,586,000, better than double the volume reported for the corresponding week last year, but 61 percent under the near-record total for a week ago.

Public construction is up 169 percent compared with the 1940 week, but declines 65 percent from last week. Private awards are 5 and 19 percent lower, respectively, than a year ago and a week ago.

The current week's total brings 1941 construction volume to $4,125,233,000, a 112 percent increase over the 33-week period last year. Private construction for the period is 44 percent higher, and public construction is up 142 percent as a result of the 420 percent gain in federal work.

In the classified construction groups, gains over last week are in sewerage, bridges, commercial buildings, and earthwork and drainage. Increases over the 1940 week are in waterworks, bridges, commercial buildings, public buildings, earthwork and drainage, streets and roads, and unclassified construction.

New capital for construction purposes for the week totals $17,501,000, a decrease of 49 percent from the volume for the corresponding 1940 week. The current week's new financing is made up of $8,949,000 in corporate security issues, $6,413,000 in state and municipal bond sales, $1,639,000 in RFC loans for industrial plant expansion, and $500,000 in RFC loans for public improvements.

New construction financing for the year to date $5,368,126,000, tops the total for the 33-week period last year by 179 percent.

CONTRACTS

(Thousands of dollars)

	Week Ending Aug. 15 1940	Aug. 7 1941	Aug. 14 1941
Federal	$7,997	$196,803	$53,536
State & Municipal	19,944	16,296	21,499
Total public	$27,941	$213,099	$75,035
Total private	17,364	20,482	16,451
TOTALS	$45,305	$233,581	$91,586
Cumulative 1941 (33 weeks)			$4,125,233
1940 (33 weeks)			$1,948,828

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	1940 33 weeks	Cumulative 1941 33 weeks
NON-FEDERAL	$1,114,495	$970,507
Corp. Securities	124,585	290,724
State & Mun.	585,023	316,543
U.S.H.A. loans	104,728	50,309
R.F.C. loans	116,159	69,373
R.E.A. loans		100,560
Federal Aid—Hwy.	184,000	163,000
FEDERAL	$808,372	$4,397,589
TOTAL CAPITAL	$1,923,067	$5,368,126

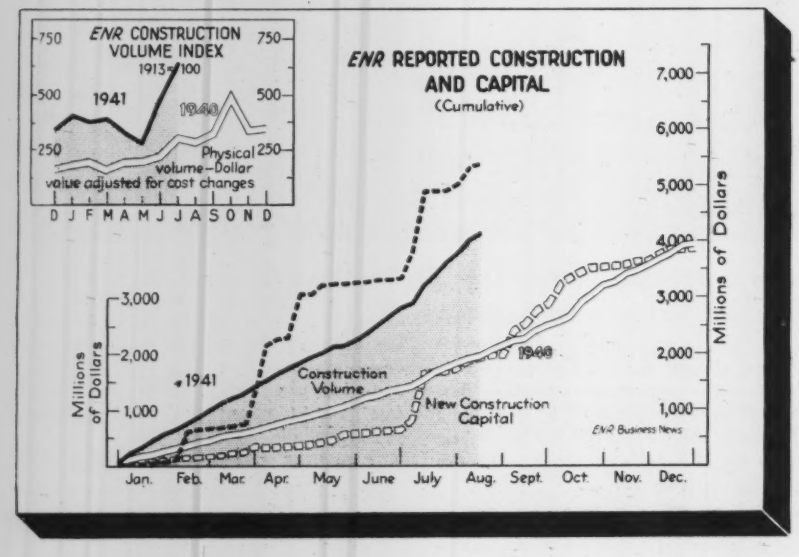
FHA MORTGAGES

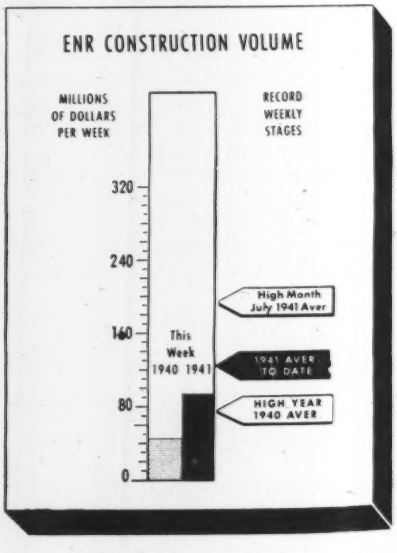
	Week Ending Aug. 10 1940	Aug. 2 1941	Aug. 9 1941
Selected for appraisal	$27,403	$23,349	$33,028*
Cumulative 1941 (32 weeks)			$930,838*
1940 (32 weeks)			$791,851

* Subject to revision.

ENR INDEX NUMBERS

Index Base=100		1913	1926
Construction Cost	Aug. '41	260.41	125.78
Building Cost	Aug. '41	212.45	114.84
Volume	July '41	635	278


ENR CONSTRUCTION VOLUME INDEX
1913=100
1941
1940
Physical volume—Dollar value adjusted for cost changes
D J F M A M J J A S O N D
ENR REPORTED CONSTRUCTION AND CAPITAL
(Cumulative)
Millions of Dollars
Construction Volume
New Construction Capital
ENR Business News
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.


ENR CONSTRUCTION VOLUME
MILLIONS OF DOLLARS PER WEEK
RECORD WEEKLY STAGES
This Week 1940 1941
High Month July 1941 Aver
1941 AVER TO DATE
HIGH YEAR 1940 AVER

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Controlling Building Appearance

Sir: Referring to the editorial, "Structures and Beauty," (*ENR*, June 5, 1941, p. 871) it has been extremely gratifying to note the improvement in the esthetic qualities of purely engineering structures as emphasized by the awards of the American Institute of Steel Construction.

I have long been of the opinion that sufficient consideration has not, as yet, been given to the subject of protecting property values through the reasonable control of the esthetic qualities of buildings.

The adoption of regulations covering "zoning" and the control which has followed over the height, bulk and occupancy of buildings, within variously zoned areas, has done much to stabilize property values and retard the obsolescence of properly zoned areas, but control has not, as yet, been undertaken over the important factor of what a building may look like and the extent to which it harmonizes with its environment.

Several notable examples of the latter result have occurred in Washington and I trust they may be emulated.

THEODORE IRVING COE
Architect, Washington, D. C.

Reinforcing in Pavement

Sir: In the "Comment and Discussion" column of *Engineering News-Record*, June 19, p. 931, Charles L. Kirk refers to certain tests conducted about three years ago by the Public Roads Administration. This investigation, the results of which were published in the October, 1938, issue of *Public Roads*, included a series of freezing and thawing, or so-called "soundness", tests on cores cut from certain concrete highway slabs in the state of New York.

As was to be expected, the tests showed that 2-in. disks sawed from the tops of the cores were less resistant to freezing and thawing than were similar disks sawed from the bottom of the cores. Because of the fact that the pavements from which the cores were taken happened to contain wire mesh reinforcement located approximately 2½ in. below the surface of the slab, Mr. Kirk concludes that, since wire mesh is customarily installed by the so-called strikeoff method, a horizontal construction joint might possibly have been created at the level where the mesh was placed. This he interprets as a possible cause of the relatively inferior quality of the concrete near the top surface of the slab and asks the question—does the steel add to or detract from the durable quality of the slab?

The fact that the top of the slab proved to be less resistant to freezing and thawing than the bottom was due entirely to surface influences occurring subsequent to the pouring of the slab, thereby producing a changed "quality" of concrete at and near the top as affected either by the surface application of ice-removing chemicals or by so-called "bleeding" or "watergain" caused by surface finishing. This is proved by the tests themselves which showed that the relative unsoundness of the concrete in the top portion of the slab was amenable to correction without any change in the structural make-up of the slab but by merely changing the cementing material from a straight portland to a blended mixture of portland and natural cements. Certainly, no evidence of a joint such as Mr. Kirk envisions was observed in any of the specimens tested in the particular investigation referred to; for the report makes no mention whatsoever of the existence of such a condition, nor is there anywhere in the report a single statement that intimates its being even a possibility.

That anyone who ventures to discuss the subject of concrete pavement design could, at this day and time, seriously ask the question, "Does steel reinforcement in a concrete paving slab do more harm than good?" is naive, to say the least. An adequate answer to such an absurd question requires only the most perfunctory examination of the findings of completed research. To cite but one reference, take the well-known nation-wide survey of the service behavior of some 5,000 miles of concrete pavements conducted some years ago under the sponsorship of the Highway Research Board and reported in the published *Proceedings* of that organization. In the report of this famous investigation is the following general conclusion:

> The data show that steel reinforcement reduced the rate of cracking and thus prolonged the life of the pavement. This applies both to concrete pavements and other pavements laid upon a concrete base.

If space permitted, much equally convincing data and many authoritative opinions could be quoted for Mr. Kirk's enlightenment. However, in view of the fact that Mr. Kirk predicates his question on a certain series of laboratory tests—tests which, incidentally, were merely soundness tests on concrete quality and in no way related to either the presence or absence of steel reinforcement—it might be appropriate to let his question be answered by E. F. Kelley, chief of the division of tests of the Public Roads Administration, the very organization that conducted the tests in question. Writing in *Engineering News-Record*, April 13, 1939, p. 481, Mr. Kelley, commenting upon the efficacy of steel reinforcement in concrete pavements, states: "In my opinion, the most adequate pavement designs are those which provide for the use of distributed reinforcement."

R. D. BRADBURY
Engineer-Director
Wire Reinforcement Institute
Washington, D. C.

The Tacoma Bridge Report

Sir: The recent "Report on the Failure of the Tacoma Narrows Bridge" (briefed in *Engineering News-Record*, May 8, 1941) is a valuable contribution on the subject of aerodynamic oscillations of bridges —particularly Appendix VI on "The Vibrations of Suspension Bridges" by W. D. Rannie and Appendix VIII on "Experimental Investigations on the Aerodynamic Characteristics of the Suspended Structure of the Tacoma Narrows Bridge" by Dr. Louis G. Dunn. Unfortunately, however, the body of the report appears to contain a number of questionable statements and conclusions.

An outstanding impression gathered from the report is that it goes out of its way to build up a case for bridges of greater width, using various comparisons in an attempt to support the

pre-conceived conclusion that wider bridges offer greater rigidity against aerodynamic effects. Since the problem is that of aerodynamic action, the comparisons should be rigidities against relative aerodynamic forces and moments and not of rigidities against arbitrarily assumed loads and moments. In geometrically similar sections, the aerodynamic lift is proportional to the width, the aerodynamic torque or twisting moment is proportional to the square of the width, and the aerodynamic negative damping moment is proportional to *the cube of the width*. Failure to take these facts into account upsets the validity of the comparisons. The figures given in the report for comparative rigidities need to be divided by the relative width or by the relative width squared, depending upon the respective arbitrary loading used.

The report gives comparative vertical deflections of different long-span bridges for a uniform load of 200 lb. *per foot of bridge*. Such comparison unfairly favors the wider bridges. To give a correct picture, the relative vertical deflections should be figured for equal loads *per square foot of bridge*. With this correction, the Bronx-Whitestone design is 1.37 times (not 2.6 times) as rigid as the Tacoma design as measured by deflections at the quarter-points; and the Golden Gate span is only 1.0 times (not 2.3 times) as rigid as the Tacoma design. These are not intended to be alarmist figures; they are the simple facts, and they should not be concealed. If the quarter-point deflections are compared as fractions of the span-length, the Golden Gate rigidity ratio is increased from 1.0 to 1.5 and the Bronx-Whitestone ratio is further reduced from 1.37 to 1.12, keeping the Tacoma rigidity as 1.0.

The comparative torsional resistances of different long-span bridges as given in the report also need to be corrected: When they are based on equal vertical forces, they should be divided by the width; and when they are based on equal torsional moments, they should be divided by the square of the width. In the first case, this reduces the relative torsional resistance of Whitestone from 4.4 to 2.3, and that of Golden Gate from 4.2 to 1.8; in the second case, the correction reduced the relative torsional resistance of Whitestone from 9.4 to 2.6, and that of Golden Gate from 12.4 to 2.3—the torsional rigidity of Tacoma being taken as 1.0 in all cases.

Similar corrections need to be made to all comparisons of this general type in the report.

That the width (horizontal presented area) is an essential factor in determining the aerodynamic lift forces on the bridge is confirmed by the high ratios of lift to drag obtained in the wind-tunnel tests on the Tacoma model. In one case, cited in the report, a wind of 40 mph. produced a lift of 180 lb. per lin.ft. while the corresponding drag was less than 50 lb. per lin.ft. Mere consideration of vertical presented area cannot possibly explain such high value of the lift.

The aerodynamic negative damping moment M is given by Dr. Dunn's equation (1): $M = K_m \rho b^3 V \frac{d\Theta}{dt}$

and is therefore *proportional to the cube of the width b*. This relation is overlooked in the body of the report.

For cross-sections of the Tacoma type, the formula for amplification or logarithmic increment (negative logarithmic decrement) of torsional oscillations, using the notation of the report, may be written:

$$\lambda_a = 0.49 \frac{\rho b}{q/g} \left(\frac{b}{i}\right)^2 (V - V_c)$$

$$= .038 \frac{b}{q} \left(\frac{b}{i}\right)^2 (V - V_c)$$

It will be observed that the width b appears in the third power in the numerator of this expression; hence, if all other quantities remained equal, the rate of amplification of oscillations would be proportional to the cube of the width. Actually, however, the dead load q increases with b, and so does the radius of gyration i. These increases in the denominator approximately cancel the increase of b^3 in the numerator, yielding the significant conclusion: For equal values of $(V - V_c)$ on geometrically similar sections and equal dead loads per square foot, *the logarithmic increment of the oscillations is independent of the width*.

If the width has any influence on the aerodynamic instability of the bridge cross-section, it is *not* as an element affecting the rigidity, but only as an element of simple distance relative to wind velocity, affecting the time (expressed as a fraction of a cycle or phase difference) for a disturbance to pass across the section. This gives rise to the significant relation or concept developed by Dr. Dunn for the critical wind velocity:

$$V_c = f(bn)$$

This does not, however, mean that the intercept V_c/bn is a constant for all sections, as erroneously emphasized in the body of the report. It is so indicated by the graph as reproduced in the body of the report, but all of the models from which this graph was obtained had the *same width*. A more careful study of Dr. Dunn's results shows that V_c/bn was not constant but had approximately the values 3.3 (for models 4a, 4b), 4.1 (for models 1a, 1b, 1c), 4.3 (for model 3), and 5.1 (for model 2). The report arbitrarily adopts the value of 4.1 as constant and as applicable to all bridges.

I fully appreciate the logic of Dr. Dunn's splendid analysis and the convenience of the parameter V/bn, but I believe that more wind-tunnel tests are needed to explore the variations of the significant intercept of this parameter for different bridge sections. That V_c cannot simply be assumed proportional to the width of the bridge is shown by Dr. Dunn's results for two other models: one with 53-ft. width and 20-ft. trusses yielded $V_c = 16$ mph.; and one with 39-ft. width and 24-ft. trusses yielded $V_c = 14$ mph. Obviously, then, *the critical velocity V_c is not proportional to the width*.

Referring to the possible installation of diagonal stays at the ends of the span to curb the undulations, the report states: "The study of these stays, although undertaken promptly, together with their proper design and installation was bound to consume months. The failure occurred before such installation could be made." This is an astounding statement. The center stays—a partial remedial measure and, incidentally, inadequately proportioned—were installed in June, 1939,—17 months before the failure. Surely 17 months should be ample time for analysis, design, and installation of more adequate safety measures. In the case of the Thousand Islands Bridge, the emergency system of end-span stays was decided upon, ordered, and installed — all in *one week* before the bridge was opened to traffic on August 18, 1938.

These first installations were temporary but they proved effective. The newly discovered aerodynamic phenomena and the corrective measures were promptly reported to the profession by the writer in an illustrated

paper before the Am. Soc. C. E. on Oct. 12, 1938, and in an article in *Civil Engineering* of November, 1938. The engineers of the Whitestone and Tacoma bridges evidently profited by this prompt publication of timely information, for they copied the mid-span stays as described by me, but without a word or credit or acknowledgement. In fact they appeared to keep their duplicate installation a secret, for I knew nothing of it for two years until after the failure of the Tacoma span. The engineers of both bridges, moreover, made the mistake of copying our initial *temporary* installation, with wire ropes. In our permanent installation, completed and installed at leisure five months later in January, 1939, we knew enough to make our mid-span stays of rigid members.

My firm (Robinson and Steinman) were the first engineers to discover these aerodynamic phenomena in modern suspension bridges, the first engineers to study them, and the first engineers to devise and install successful corrective measures.

The Tacoma report refers to my firm's prior experience as follows: "These bridges are more nearly comparable in size to some of the early flexible suspension bridges. They give no clue to the possible behavior of a suspension bridge 3½ times longer and 6 [?] times heavier." I submit that suspension bridges of 750, 800, and 1,080-ft. spans, exposed to actual wind conditions, can give better and more realistic information than small-scale models exposed to electro-magnets or to dropping weights. If the mid-span stays at Tacoma had been more adequately proportioned, as in our *permanent* installation at Thousand Islands, and if they had been supplemented by the necessary end-span stays, I am confident that the Tacoma span could have been saved.

Perhaps the most interesting and significant diagram in the report is Fig. VIII-19, showing the wind-tunnel moment or torque graphs of various sections. Some six months before this publication, I sketched practically identical torque graphs from qualitative aerodynamic considerations; and I predicted the negative slope of these graphs. I believe that *the negative slops of the torque graph spells aerodynamic torsional instability*. This significance of the wind-tunnel graph has been missed by the authors of the report; in fact they have reversed the interpretation. The correct interpretation, utilizing the concept of composition of velocities, furnishes the significant relation that a negative slope in the torque graph yields increments of torque in proper resonant phase relation to produce automatic cumulative increase of torsional oscillations. From the negative slope of the torque graph I have deduced the formulas for negative logarithmic decrement of torsional oscillations and I have checked the maximum oscillation amplitudes observed at Tacoma. To say, as the report does, that the torque graph of the Tacoma section represents torsional stability is obviously inconsistent with the known behavior of the structure.

Fig. VIII-19 is further interesting and significant in showing that different sections, with different ratios of girder depth to roadway width, have *practically identical torque graphs*. This confirms my thesis that the rate of amplification of torsional amplitudes, once they are started, is unaffected by the width-ratio of the bridge.

In conclusion, the report on "The Failure of the Tacoma Narrows Bridge" leaves many important questions unanswered. It does not tell what combinations of cross-sections produce aerodynamic instability, how aerodynamic instability can be reasonably predicted or readily tested, nor how it can be prevented. There are ways of designing sections to avoid or eliminate aerodynamic instability, and that is perhaps better engineering than merely placing all of the emphasis on adding rigidity to provide increased resistance to a dangerous inherent characteristic. It is more scientific to eliminate the cause than to build up the structure to resist the effect.

D. B. STEINMAN
Consulting Engineer, New York

Design Changes and Economy

Sir: In *ENR*, June 5, p. 57, Arnold A. Weitzman proposes a few changes in our design practice in order to conserve construction materials. He proposes to raise working stresses, to consider the columns fixed top and bottom, use less protection for bars in slabs not exposed to weather, to space bars in beam claser to permit narrower widths.

Lately there seems to be a tendency among some engineers to look upon a structure as a bundle of stresses statically locked in eternal struggle with superimposed loads. They forget that the structure is an assembly of members which constantly distort, shrink, expand, move and settle. While all these movements are very vague and uncertain, they are responsible for the stresses in the structure. To those who are not familiar with the intricacies of these movements, engineering problems look simple and definite; they compute the sizes of the members using elementary formulas, the limitations of which they do not care to know.

I believe that one should spend a great deal of thought before raising the working stresses for the purposes of economy. The saving of money could be greatly effected by a more perfect coordination among engineers, architects and owners. They should strive to attain simplicity and repetition. Keeping in mind the roughness of construction methods in the field, they should give to the contractor easily erectable structures. Very frequently it is advisable to use larger members and more material in order to obtain an economical structure.

M. V. PREGNOFF
Hall & Pregnoff
Structural Engineers
San Francisco

Correction

In your Feb. 13 issue of the *Engineering News-Record* we note that you have listed Emil Brown & Co. as the contractor on the new $17,000,000.00 Parts Plant for the Consolidated Aircraft Corp. This listing is in error, as the undersigned is the general contractor on this project and Emil Brown & Co. is one of the subcontractors.

B. O. LARSEN
General Contractor, San Diego, Calif.

Home Office, St. Louis

Sir: In your article on our work on the Fort Riley, Kan., cantonment projects in the July 24 issue, p. 135, there is an error in the designation of our place of business. The home office of Widmer Engineering Co. has been located for years in St. Louis, Mo. The offices at Junction City, Kan., and Fort Riley were established as branch offices only for the duration of the project.

K. H. MIDDENDORF
Manager of Projects
Widmer Engineering Co.
St. Louis, Mo.

EDITORIALS

VOLUME 127 NUMBER 7

August 14, 1941

Extravagant Building Codes

MATERIALS for non-defense construction are going to be increasingly difficult to obtain. A slogan of "substitute or save" is just around the corner, and it is well to begin thinking about practicing it. One place to start saving is with municipal building codes, which in many instances are unmercifully padded with extravagant labor and material requirements. Engineers could do their communities and the nation a distinct service by analyzing all the so-called "minimum requirements" in city building codes. There is pay dirt in a lot of these. And striking it will not only conserve materials for defense; it may well permit useful non-defense work to go ahead that otherwise would be held up.

Where Is Passamaquoddy?

SURELY PASSAMAQUODDY'S TIDES should be harnessed in the interests of defense! Last week the Florida Ship Canal was dropped into the omnibus rivers and harbors bill along with the St. Lawrence seaway and power project in order, it might be surmised, to keep the President from vetoing the bill on the ground that its proposed expenditures are not essential to defense. As the prospects for favorable action by the House on a separate bill to authorize the St. Lawrence work began to wane, the President asked that it be included in the rivers and harbors bill, thus making his approval a foregone conclusion, despite the fact that the bill contains many projects not essential to defense. So the committee complied with his wish, dropping the Florida Canal in for good measure. Why not add Passamaquoddy to make the farce complete?

On the Spot

NATIONAL LEADERS of the Building and Construction Trades Department of the American Federation of Labor are being put on the spot by local union leaders who refuse to abide by the non-strike agreement signed between the AFL and OPM on July 24. Hardly was the ink dry on the agreement when the powerful electrical union in New York called out its men at the Navy Yard. Though these men are now back at work, strikes are cropping up elsewhere in protest over the provisions of the OPM-AFL agreement or for other causes. These local strikes stand as a challenge to the labor leaders in Washington and put in question the significance of their signatures on any agreement. It is to be hoped also that the strikes will raise misgivings in the mind of the social betterment theorists in Washington who would settle all our labor troubles by the simple expedient of unionizing everyone.

From Theory to Practice

OFTEN it is possible to demonstrate in a laboratory that certain steps will lead to desirable results, but when that has been learned it remains for the field men to determine how the same results can be obtained with much larger quantities and with the available equipment on the job. A good example of this process of converting laboratory theory to field practice is found in the work of the Texas Highway Department reported elsewhere in this issue. Laboratory studies showed that sandy soils, unsuited for highway use in their natural state, could be made satisfactory by the addition of definite quantities of clay, but field work revealed great difficulty in getting a uniform clay-sand mixture. The difficulty was overcome by making a slurry of the clay and mixing it into the sand on the road. Worthy of special note is the observation of D. E. H. Manigault, author of the article, that the method may be applicable to embankment construction where cohesionless soils have to be used.

Save Something for the Future

NOT EVERYTHING can be done at once, but this thought does not seem to have occurred to Congress, which continues to appropriate for non-defense work, such as much of that included in the current flood-control bill. No one knows better than engineers the necessity and desirability of improving our river control to prevent disastrous floods, but engineers also realize that there is a limit to what should be undertaken at one time. With the defense effort in full swing, most of the engineering construction personnel of the country is gainfully employed, material supply and transportation facilities are pushed to the point of priorities, and the taxpayer certainly is being asked for sacrifices. Planning for flood-control work merits continuation, of course, but there is also merit in keeping appropriations to the minimum necessary for work that directly and vitally protects defense industries. Such procedure will also save projects for the future when they will be sorely needed.

Protect the Drawings

DESIGN TRACINGS, more than anything else the engineer or contractor handles, deserve absolute protection against fire. If, as news reports indicate, plans for new planes for Britain were destroyed when a factory under construction in Canada burned recently, there is available a case in point. Installation of fireproof vaults is mandatory for drafting rooms of even the most hurriedly constructed temporary buildings. And the drawings when not in use should be placed in the vault, even though it involves inconvenience in removing them from the drafting tables every night. Added vigilance is necessary these days when time lost because of destroyed design drawings may be translated directly into lives lost in battle.

Fast Action Needed

FROM A DEFENSE ANGLE, the President's veto of the emergency road bill means a further set-back to the construction of badly needed access roads to military camps and defense plants. It means also that expanded work on the main strategic network is further delayed, perhaps postponing to next year work which could have been inaugurated this year. All of which points directly to the need for prompt drafting of an emergency road bill that can be quickly enacted and signed.

It will be well for those in charge of the new legislation to note that the President received wide public support for the views expressed in his veto message. To authorize expenditure of $125,000,000 on the strategic highway network as an emergency measure and then spread that money out over all the 48 states, even though in accordance with the fair, efficient and absolutely non-pork-barrel formula that is applied to regular federal-aid programs, did not make sense to the man in the street.

For those interested to look behind the scene it should be stated that justification for the bill-drafters' action lay in the fact that the War Department has not said that any one part of the strategic network is more important than another. So far as those charged with planning the nation's roadbuilding program are concerned, the War Department wants roads in Nebraska brought up to military standards just as quickly as roads along the Atlantic or Pacific seaboards. Hence, with all the states asking for money to try to meet the Army's needs, road authorities in Congress simply added $125,000,000 to the money already authorized for regular road work so that work on the whole strategic network could be speeded up.

Thus, while superficially responsibility for the present impasse appears to rest on Congress, actually it rests with the President and the War Department: with the President for his failure to ask Congress for supplementary defense road authorizations until the year was half over, and with the War Department for not having listed the roads calling for preference as necessary to defense. The War Department has avoided such listings of road priorities to escape the importunities of politicians who wanted the War Department stamp of approval for pet projects; now its failure to set up priorities has brought down on Congressional road leaders the charge of playing politics.

What is needed is a new bill similar to the one just vetoed except for the system of allocations, which should be placed in the hands of the Public Roads Administration and the War Department. This new bill should clearly state that the method of apportionment thus prescribed applies only to the emergency expenditures that it authorizes, and in no way affects the system of apportionment set up in the Federal-Aid Road Act of 1916, which the new act supplements. This is necessary to preclude attempts to use this emergency act as an entering wedge in an attack on the 1916 system of apportionment.

As to the amount to be authorized, time probably will show that the $125,000,000 set by Congress is much closer to actual needs than the President's estimate of $25,000,000. Until more is known about maneuvering mechanized divisions through congested areas, it would be shortsighted indeed not to lay the groundwork for the great road expansion that many road authorities believe will be necessary. The President is not an advocate of continuing large federal expenditures on highways, possibly because control over appropriating and spending the money is entirely outside his hands. Recognizing this, the new bill should go just as far as possible in meeting the President's objections to the old one without sacrifice of the sound principle of having the federal funds spent by the state highway departments under supervision of the Public Roads Administration.

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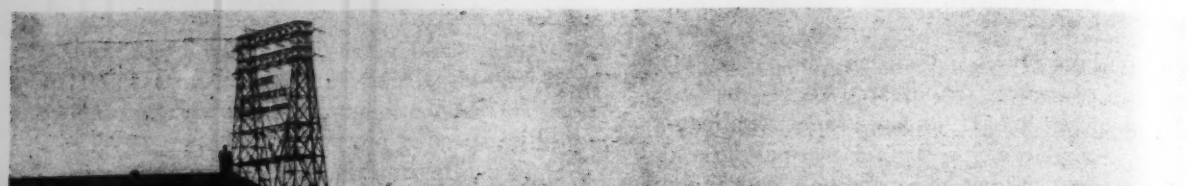


Fig. 1. Upper end of the flood wall built at Holyoke to protect mills in low-lying areas of the city from high water.

Flood Walls Protect Mills at Holyoke

Carl H. Lovejoy
Senior Engineer, U. S. Engineer Office, Providence, R. I.

***Contents in Brief**—To protect low-lying mills at Holyoke, Mass., from floods in the Connecticut River, flood walls have been built along part of the waterfront of that city. These walls, at many points, have had to be equipped with gates to permit passage of water from the mill turbines and from processing and yet to check the entrance of flood waters.*

FLOOD WALLS were completed recently in Holyoke, Mass., as part of the comprehensive plan for flood control in the Connecticut River valley that was authorized by Congress in June, 1938 (*ENR*, July 17, p. 82). They give protection to many paper mills and to the municipal gas plant, all located along the edge of the Connecticut River.

The industrial section of Holyoke is built around a system of canals. In 1849 the Connecticut River was dammed with a timber dam and the canal system begun, leading the water to the mills where small water wheels were directly connected to the machinery. In some cases these direct connections still exist, but in most mills the water wheels now drive electric generators. Water from the wheels is returned to the river through tailraces extending back from the river below the dam. In 1897-98 the wooden dam was replaced by a masonry dam 30 ft. high, which is still in use. It has been through three floods, 1927, 1936 and 1938, though in 1936 granite blocks to a depth of about 4 ft. were washed away from the crest. The maximum heights of water over the dam in those floods were respectively 14.8, 16.8 and 14.9 ft.

After the flood of March, 1936, the Providence District of the U. S. Engineer Department, made a report on flood conditions at Holyoke and submitted tentative recommendations for protective measures and preliminary estimates as to their cost. The Holyoke project was authorized by Congress in the Flood Control Act approved June 28, 1938. In July of that year a detailed survey was started preparatory to actual design for making contract drawings. Soon after the hurricane and flood of September, 1938, money was made available for preparation of plans, and for construction.

In order to get work started at once a 600-ft. length of wall beginning just below the dam was built by hired labor. The foundations for that section were on rock and no tailraces were involved. The top of that wall is about one foot higher than the 1936 high water, which is considered adequate in view of the flood-crest reduction expected from the upstream reservoirs that now are being built.

In the summer of 1939 a contract for a further extension of that wall was awarded to Daniel O'Connell's Sons of Holyoke, who were low bidders at approximately $900,000 for the job. The work consisted mainly of a reinforced T-type cantilever concrete wall 5,020 ft. in length, varying in height from 8½ to 37 ft. with an average height of 12 ft. above ground. Along its length were nine tailrace structures, some with one gate, some with two and one with three. Four

sizes of gates were used—10 x 11 ft., 13 x 11, 14 x 12 and 16½ x 12 ft.

The specifications provided that in building the tailrace gate structures the water power should only be shut off for a limited time, varying from 16 to 30 days depending on the size of each structure. During this shutdown period the mills were run by auxiliary power, usually electric, but the contractor was required to take care of the process water from the paper manufacture. To keep the shutdown time to a minimum the contractor was required to work 24 hr. per day, including Sundays and holidays, when working on a gate structure.

Construction of a typical tailrace structure is shown progressively in Fig. 2. It is located on one of the channels that carry water from the mills back to the river. A steel sheetpile cofferdam was driven across the tailrace outlet, closure being made on a Saturday while the mill was shut down. The water inside of the coffer was pumped out and a sandbag dam was placed in the tailrace to hold back the process water when the mill resumed operations Monday morning. Then a temporary flume was built to carry this process water, and any leakage through the penstock headgates and waterwheels, to a sump inside the cofferdam but beyond the limits of the contemplated structure. The masonry head walls and a few feet of the ends of the old brick tailrace arches then were removed.

The floors of these old tailraces were of timber, sometimes 75 years old, and usually the wood was found in perfect preservation. A new concrete floor, 3 ft. thick, was poured first, then the walls and then the roof, making a concrete conduit extending the tailrace and tying into the reinforced cantilever flood wall on each side. The foundations of this wall were stepped up on each side from the elevation of the invert.

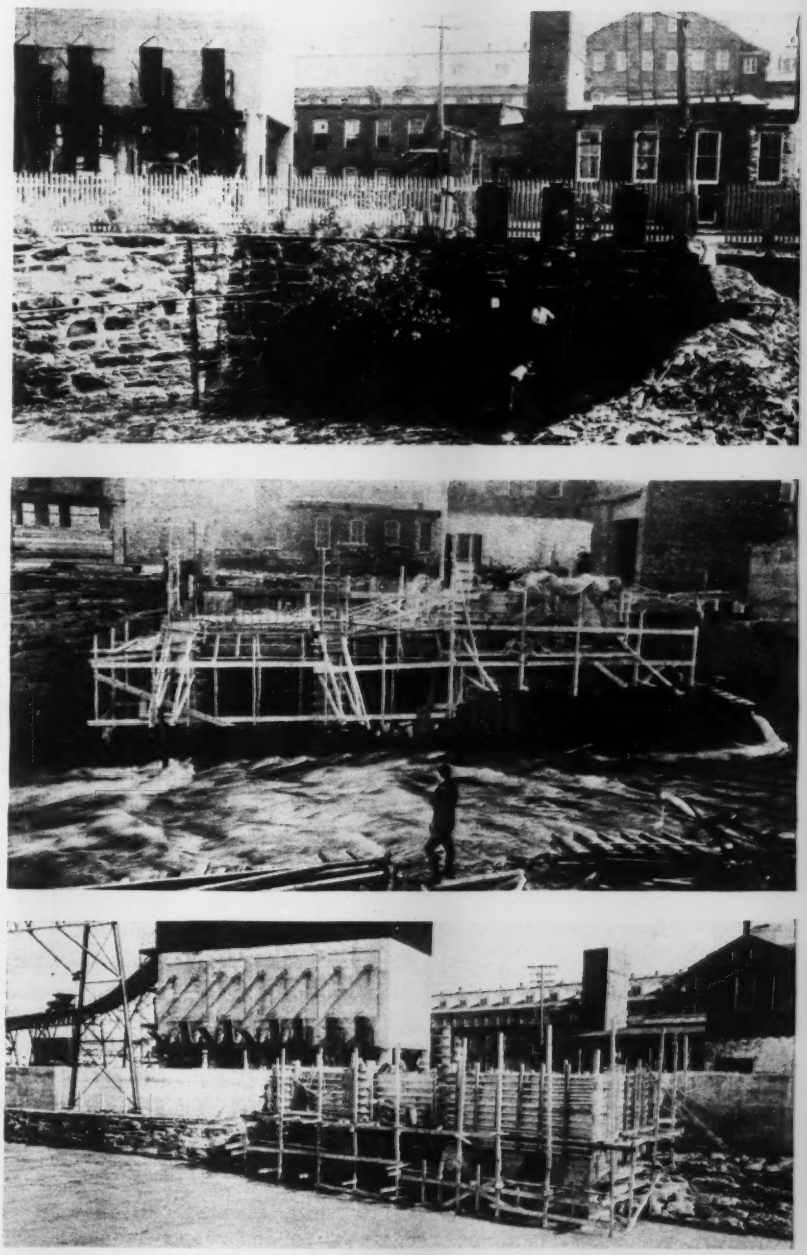


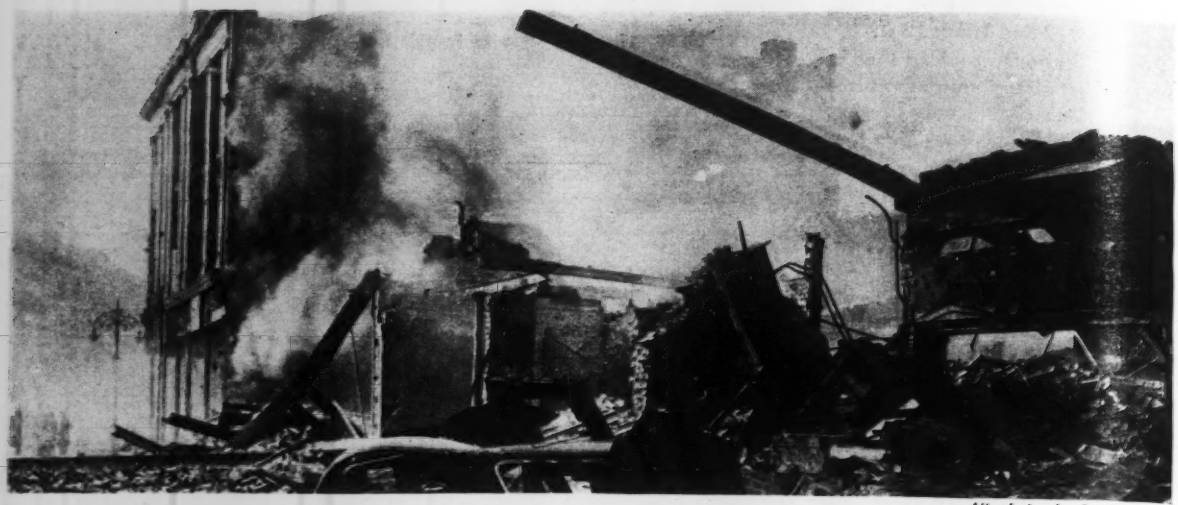
Fig. 2. Three stages of construction of one of the tailrace gate structures. At the right in the lower picture is a pumping station for stormwater and sewage.

Among the facilities that had to be provided in connection with the construction of this section of wall were pumping stations to raise stormwater and sewage into the river at time of flood. Four such stations were built in the 5,020-ft. section covered by this contract. Two are equipped with two 24-in. deep-well pumps, and two with 30-in. pumps. All pumps are driven by electric power from one of three independent sources of power, power coming to the pumping stations through two lines of heavy cables run in 3-in. fibre conduits buried in the wall. Gates at the mill tailraces are not power-operated, all being raised or lowered by direct-acting hand-operated hoists.

The upstream portion of the work near the dam was founded on rock but where the rock became too deep, foundations were on compacted sand or gravel with sheetpile cutoffs to rock or to a 25-ft. depth to prevent seepage under the wall.

Much of the work was in narrow quarters with underground gas, water and steam lines to be relocated. A railroad track serving the mills and paralleling the wall had to be maintained at all times. Despite the many difficulties the work was completed in the contract time of 480 days.

The walls were built chiefly under the direction of Lt. Col. J. S. Bragdon while he was serving as district engineer at Providence, and Capt. A. G. Viney, chief of operations. Work in the area in which Holyoke is located was supervised by the writer with W. O. O'Rourke as resident engineer.



All photos by Fox Photos, Ltd.

Fig. 1. No ordinary type of construction can resist high explosives of heavy caliber.

London Letter On

Buildings Under Bombing

O. Bondy
Consulting Engineer, London, England

***Contents in Brief**—By airmail from London comes this first-hand account of structural damage from bombing. Oblique hits on walls are more common than vertical hits on roofs. Damage even from same size bombs is extremely variable. Fireproofing of steelwork is particularly important. Bearing-wall buildings are especially vulnerable.*

WHEN PEOPLE THINK of aerial bombing, they nearly always picture vertical hits. The man in the street has mainly been anxious to protect himself against the "bits of cake" coming from above, and the tin hat is the symbol of this natural attitude. Yet it can offer no protection against the blast and lateral splinters that, in case of a bomb explosion, sweep over a wide area and cause the greatest number of casualties.

British engineers engaged on structural air raid precautions, such as the construction of air raid shelters, had, first of all, to provide against the effects of these lateral forces, and actually only a comparatively small quantity of material is needed to guarantee a high degree of protection. Safety against direct bomb hits, however, either vertical or at an angle, requires such amounts of material and labor that really bombproof shelters have been found to be practicable only in special cases. The accompanying table may give an idea of the necessary thicknesses for roofs of shelters intended to be safe against direct hits. In practice, for want of time, London people had to be satisfied with compromising and with accepting a certain limited standard of overhead and lateral protection in their shelters.

Hits at an angle are more frequent than had been expected. A bomb penetrated the side wall of the historical Middle Temple Hall, a large, relatively low structure, and caused only minor damage to the fine timber roof structure. The effect of a skew hit is illustrated in Fig. 3.

Much worse are the effects of direct hits of high explosives of heavy caliber, as shown by Fig. 1. Here, steelwork of the kind generally used in pre-war times is of little use; the mutual connections of steel members and those between them and the walls are far too weak to resist the lateral forces. Even if heavy rolled sections or compound girders are used, complete disintegration of the structure cannot be prevented, as the few bolts or rivets cannot provide sufficient anchorage and rigidity.

It is important to note that the

MATERIAL THICKNESSES REQUIRED FOR BOMB PROTECTION

From A.R.P. Handbook No. 5

Weight of bomb (lb.)	110	220	660	2,200	4,000
Depth of penetration in earth	13 ft. 9 in.	14 ft. 5 in.	20 ft. 8 in.	29 ft. 6 in.	38 ft. 0 in.
Proof thickness against penetration:					
(a) Soft rock	11 ft. 6 in.	16 ft. 6 in.	24 ft. 8 in.		
(b) Reinforced concrete	2 ft. 10 in.	3 ft. 6 in.	4 ft. 11 in.	7 ft. 9 in.	9 ft. 4 in.
Thickness just perforated without explosion:					
Mild steels	3 ft. 9 in.	4 ft. 7 in.	6 ft. 7 in.	10 in.	12 in.

(6) (Vol. p. 214)

effects of the lateral forces from explosions are not always in proportion to the weight of the bombs. One finds small craters surrounded by far-reaching destruction by blast and, on the other hand, large craters where damage is restricted to one or two shop windows at a distance of say 30 ft. The effects in vertical direction are also amazingly varied. Splinter marks from heavy explosions at street level can sometimes be found in the ground floor only, while in other cases heavy shell pieces, debris and splinters are hurled to the tenth floor and higher.

Again and again surveys of the damage lead to the conclusion that it is the lateral forces of the explosion that are most dangerous.

Fig. 2 shows the remainder of a building in Ave Maria Lane, near St. Paul's Cathedral. A brick structure with stone facing and steel girders on cast-iron supports, the outer walls together with the adjoining girders and columns were sucked outward by the blast, and thereby large parts of the building were deprived of their supports. It seems that, in this case, it was the very weakness of the girder connections that saved part of the building from collapse, although destruction was pretty complete.

Up-to-date framed structures designed to take lateral forces have shown superior resistance to all sorts of bomb effects. This holds true of both steel and reinforced concrete. One modern steel skeleton building, its exterior fairly intact, stands between badly damaged old houses. Inside, its nine stories are burned out, but it has kept its shape and will be easily and quickly repaired. Here, encasing of the steel members, especially of the columns, has proved to be of decisive importance and actually saved the building. Of course, the London County Council regulations, like those in other countries, contain strict rules concerning fire protection of steelwork, but in the light of the new experience with air raids, when tens of thousands of incendiary bombs are dropped during a single night, more and stricter rules will have to be introduced. It happened, for example, that certain types of hollow concrete floors did not stand the fire, since the air enclosed in the hollow tiles expanded and fractured the tiles. In some such cases, floors and party walls fell down from top to bottom, only the framework and outer walls remaining in position.

A high-explosive bomb hitting the outer wall at an angle caused the damage shown in Fig. 3. The building is one of London's landmarks, nine stories high and with a modern steel skeleton. The bomb exploded inside, blew some wall panels out and destroyed a few partitions and floors, but the framework, including its strong concrete encasing, stood the test wonderfully.

In conclusion it can be said that the types and effects of the bombs used in recent air raids are so manifold that it is not possible to state rules without systematically dealing with each group: high explosives of various calibers and types; vertical and skew hits; bombs dropped from great heights or from just above the roof tops; hits on hard pavements or on soft soil.

One thing is certain: Protection of buildings against fire caused by incendiary bombs must be improved; especially must the load-bearing parts such as columns, girders and floors be given a high degree of heat resistance.

Another fundamental point relates to stability of structures when exposed to lateral forces caused by explosion. This problem is technically related to that of structural protection against earthquakes, although the lateral forces in that case act at or below ground level, whereas with bombs they may act at any floor where the explosion occurs. Modern rigid-frame structures of steel or of reinforced concrete, properly designed and constructed for "monolithic" action, meet these requirements far better than the ancient types of buildings. But at best a big problem confronts the structural designer. And it has to be solved, not in the future, but today.

Fig. 3. A side wall hit and an inside explosion caused this damage, which is confined to walls and floors.

Fig. 2. Debris in foreground is made up of building walls and framework sucked outward by bomb blast.

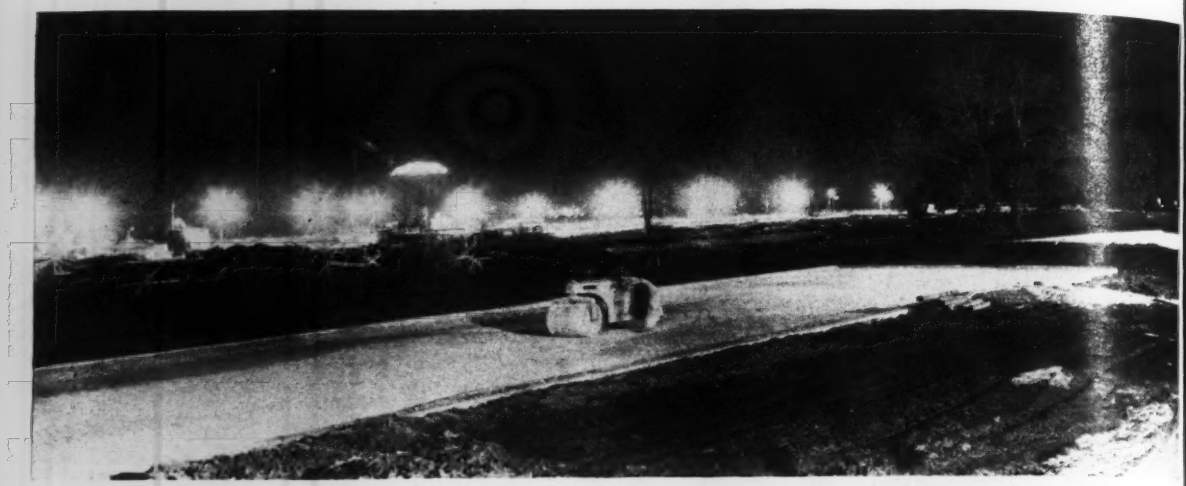


Fig. 1. Night lighting turns darkness into day at Kingsbury Ordnance Plant.

Radio Aids Ordnance Plant Construction

***Contents in Brief**—The contractor on the Kingsbury Ordnance Plant near LaPorte, Ind., is directing a fast and efficient construction schedule with the help of 36 short-wave two-way radios located at strategic points around the job and in cars of supervisory personnel. Construction includes steel, tile, wood and concrete igloo storage houses, asbestos-cement covered steel and concrete shell loading plants, railroads, roads, utilities and service buildings spread out over an area 8 miles long and 3 miles wide.*

PACED by a practical-minded constructing quartermaster whose sole idea is to get ammunition rolling off the assembly lines at the earliest possible moment, the army's new $28,000,000 shell-loading works, known as Kingsbury Ordnance Plant, is rising at a rapid rate out of the Indiana farmland south of LaPorte.

Radio is playing a very important part in construction of this large project, for the ingenious and enterprising contractor, Bates & Rogers Construction Corp., has installed 36 two-way radio sets in various strategic locations throughout the job and in cars of the supervisory force. Radios have also been located in the offices of Major B. T. Rogers, constructing quartermaster, Giffels & Vallet, Inc., and Charles W. Cole & Son, architect-engineers. All stations are on the same wave length and, with all key offices and top personnel in constant communication, the job is being directed on the basis of a continuous conference—a most efficient procedure.

Official starting date of the project, which began as an $11,500,000 job, was Nov. 4, 1940. Scheduled completion date is Nov. 1, 1941, though parts of the plant are ready for operation now. The project is right on schedule today. This and similar plants are proceeding under design difficulties. There is little precedent in design of large-scale munition plants, for never before have we had to produce ammunition in such quantities. World War production schedules will be so far surpassed that they do not serve even as a measuring stick.

MAJOR EQUIPMENT IN USE AT KINGSBURY

Shovels, cranes & draglines, 1 to 2-yd.	20
Truck cranes	6
Locomotive cranes	4
Tractors and bulldozers	38
Carrying scrapers, 12 to 16-yd.	16
Rooters	4
Ditcher	1
Portable compressors, 210-315-c.f.	9
Motor graders	6
Road rollers	6
Concrete road finishing machines	4
Standard-gage steam locomotives	4
Generating plants	101
Mixers, 1-yd.	4
Transit mixers, 2-yd.	36
Stiffleg derricks	2

Naturally, therefore, at Kingsbury construction is pushing design. The ordnance department is pounding everyone to get the plant in operation. The operators, who will have to use the facilities being built, have their ideas about certain details. The C.Q.M. and contractor are working at top speed, so the architect-engineer is squeezed in the middle trying to satisfy all concerned and get the plans out as fast as the contractor needs them. In spite of these circumstances, the job is proceeding with little confusion and utmost efficiency. It is a splendid example of what can be done by the construction industry under pressure.

Ideal site and layout

No defense project has a better topographical setting. The plant covers 13,133 acres (roughly 8 miles long and 3 miles wide) of nearly level Indiana farmland. It is surrounded on all sides by railroads: Baltimore and Ohio to the south, with two connections; Grand Trunk to the northwest, one connection; Wabash on the north with two connections, and one connection with the Nickel Plate to the east. To the west lies U. S. Route 6, a concrete paved trunk highway. Through the site run miles of passable country roads, all of which have

been improved as construction and access roads. All former inhabitants have been removed from the site and the area is closed to the public. Drainage is all to the Kankakee River, which forms the southeast boundary.

Kingsbury is a shell-loading plant, and no manufacturing of materials will be done there. From a production standpoint the project is well laid out. Smokeless powder and high explosives are stored in concrete igloos at one end of the site. Not far away is a series of storage buildings for inert materials, such as cartridge cases and projectiles. Primers and boosters are stored in another area. From these regions the materials flow (by standard-gage railroad) through lines of loading plants where 25, 60, 37 and 20-mm. shells will be produced, and fuses and boosters assembled. From the loading lines the products go to storage, finished ammunition in one group, fuses and boosters in another. Included in the project are 11 permanent residences for army officers, and a repair shop and warehouse group of buildings. Several large administration buildings now in use by construction forces will be utilized as the permanent plant offices.

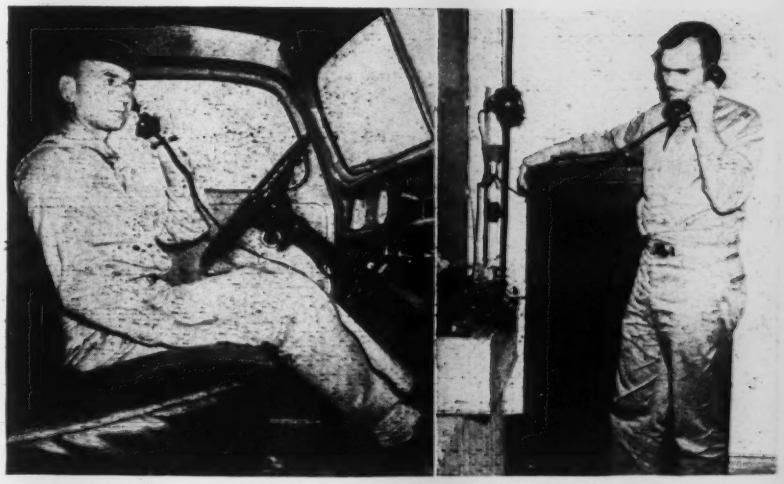


Fig. 2. The job is run by radio. Here a lieutenant in his car in the field talks with a captain in the office.

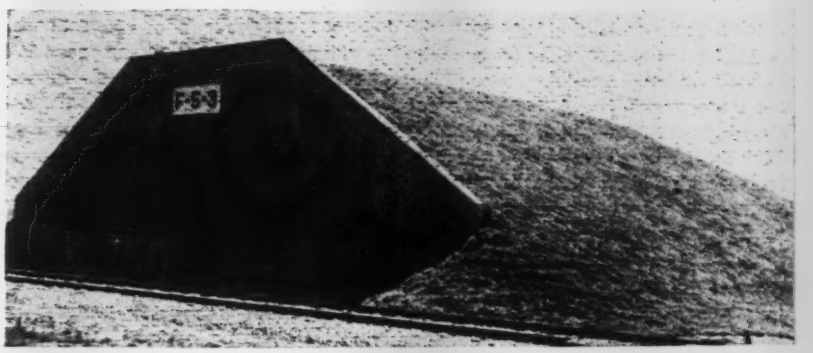


Fig. 3. High explosives are stored in earth-covered concrete igloos, served by railroad spurs.

Quantities indicate job scope

The vast scope of the project is indicated by the following major quantities. Since this list was compiled, however, additional facilities have been authorized, which will increase certain quantities, particularly those pertaining to buildings.

Enclosing the entire site and many of the various units are 44 miles of woven wire fencing, topped with barbed wire. General grading, including roads and railroads, but excluding building foundations, amounts to 1,570,000 cu. yd. Concrete will exceed 130,000 cu. yd.; steel will top 20,000 tons. There are 74 miles of railroad within the site, mostly first-class well-ballasted lines with rail up to 100 lb. A splendid classification yard serves the railroad system. Practically every manufacturing and storage building is on a railroad spur.

Permanent roads total 74 miles, and some 30 miles of temporary road were built for construction purposes. Major roads include 3.3 miles of 30-ft. trunk route, consisting of two 10-ft. concrete lanes outside a 10-ft. center lane of 2-in. bituminous surfacing; 16 miles of 20-ft. bituminous surfaced roads; 11.5 miles of two-lane water-bound macadam; 11 miles of two-lane slag road with sealed surface; and 19 miles of single-lane route of the same construction. About 13 miles of old roads are to be improved. Parking areas and walks will require 35,000 sq. yd. of gravel or stone surfacing.

Water supply and distribution includes four deep wells and pumping plants, a water chlorinating and zeolite treating plant, four 200,000-gal. elevated steel tanks and 29 miles of steel pipe 12 in. and smaller in size. Many buildings will be equipped with sprinklers, a total of 11,660 heads being required.

Six pumping stations will handle the sewage to a disposal plant, pumping through 15 miles of clay and concrete pipe ranging in size up to 24 in. Stormwater will run off through natural drainage, though several ditches have been dug to provide added drainage in some areas.

Including fence lighting, there are 84 miles of electrical distribution lines. All power comes from three diesel generating plants, each consisting of three 1,400-hp. units. Heating and processing steam will be supplied by five boiler houses aggregating 6,950 hp. There will be 37 miles of telephone and 31 miles of fire alarm system on the project.

The buildings are mostly one-story of several types. Aggregate floor space in the principal units is as follows: Manufacturing—load lines, 760,000 sq. ft.; fuse lines, 151,000 sq. ft.; booster lines, 29,000 sq. ft.; black powder pellet line, 27,000 sq. ft.; and primers, 38,000 sq. ft. Storage—high explosives and smokeless powder igloos, 77,000 sq. ft.; finished fuse and booster igloos, 52,000 sq. ft.; inert storage area, 445,000 sq. ft.; and finished ammunition, 467,000 sq. ft. Connecting the individual buildings in the manufacturing groups are 20,000 lin. ft. of covered ramps. Through these ramps and the buildings run 63,000 lin. ft. of conveyors.

Most interesting of all buildings,

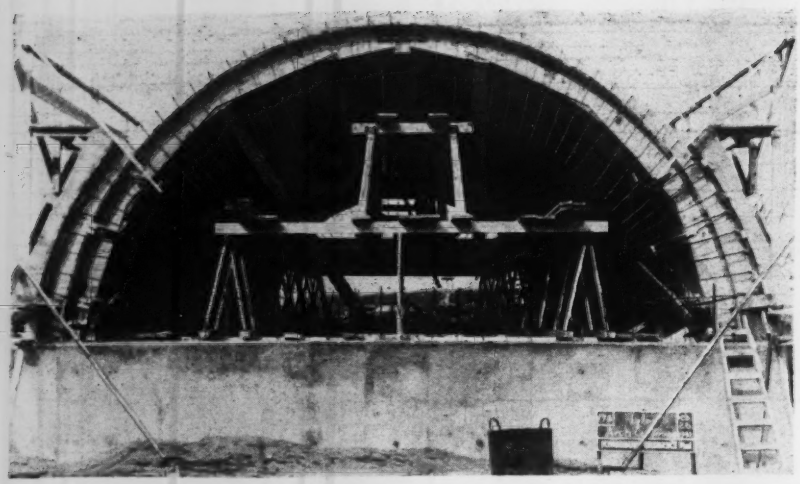


Fig. 4. Arch forms on one of the igloo magazines ready for concrete. The laminated wood trusses required no interior bracing.

from a structural standpoint, are the so-called underground magazines or igloos. Strictly speaking, these are not underground units, but are built above ground with the floor at car door level. They consist of a concrete arch roof on concrete foundations. Arch walls, resting on a continuous footing 8 ft. wide, are 9 ft. 10 in. high, tapering from 25 in. wide at the bottom to 12 in. at the springline of the arch, with inside face vertical. The arch roof, varying from 12 in. thick at springline to 6 in. at the crown, has a span of 26½ ft. and a rise of 12 ft. 9 in. There are three lengths of igloos: 40, 60 and 80 ft. At the rear is a 7-in. concrete wall enclosing the arch; at the front is a similar wall, but it extends beyond the side limits of the igloo as a counterforted wall to form a front face. The floor is a 6-in. concrete slab placed on fill, not tied into the arch walls. The arch thrust is taken by 12x12-in. concrete tie beams set below the floor slab. The outside of the arch barrel and back end wall are treated with membrane waterproofing. A covering of earth, 2-ft. minimum thickness at the crown, and placed on a 1½:1 slope, completely encases the igloos except the front faces. At the front is a sealed iron door opening onto a small loading platform. The igloos are unheated and unlighted. They are protected by lightning rods, and all reinforcing is grounded through copper cables.

The loading buildings are also of interest. They consist of a series of transverse concrete walls, forming bays about 20 ft. wide, on concrete floors and foundations. Ends of the bays are enclosed by corrugated asbestos-cement sheets. The roof is steel channel purlins covered with corrugated asbestos. Behind these units are small powder service buildings, mostly of concrete, from which powder is fed in driblets by conveyors to the loading stations. In front of each manufacturing group is a bomb-proof concrete change house that will accommodate all the employees in the area in case of emergency. Other buildings in the manufacturing area are steel-frame with asbestos-cement walls and roof.

In the finished ammunition storage area are 42 steel-frame tile buildings, 52x218 ft., with concrete floors and foundations. The roofs are corrugated asbestos on steel trusses and purlins. Walls are 8-in. glazed hollow tile, with no exterior or interior finish except that the columns are bricked in. In each 20-ft. bay between trusses is a 24-in. ventilator in the roof. Delay in obtaining steel for storage houses for inert materials led to use of wood framing and trusses, with

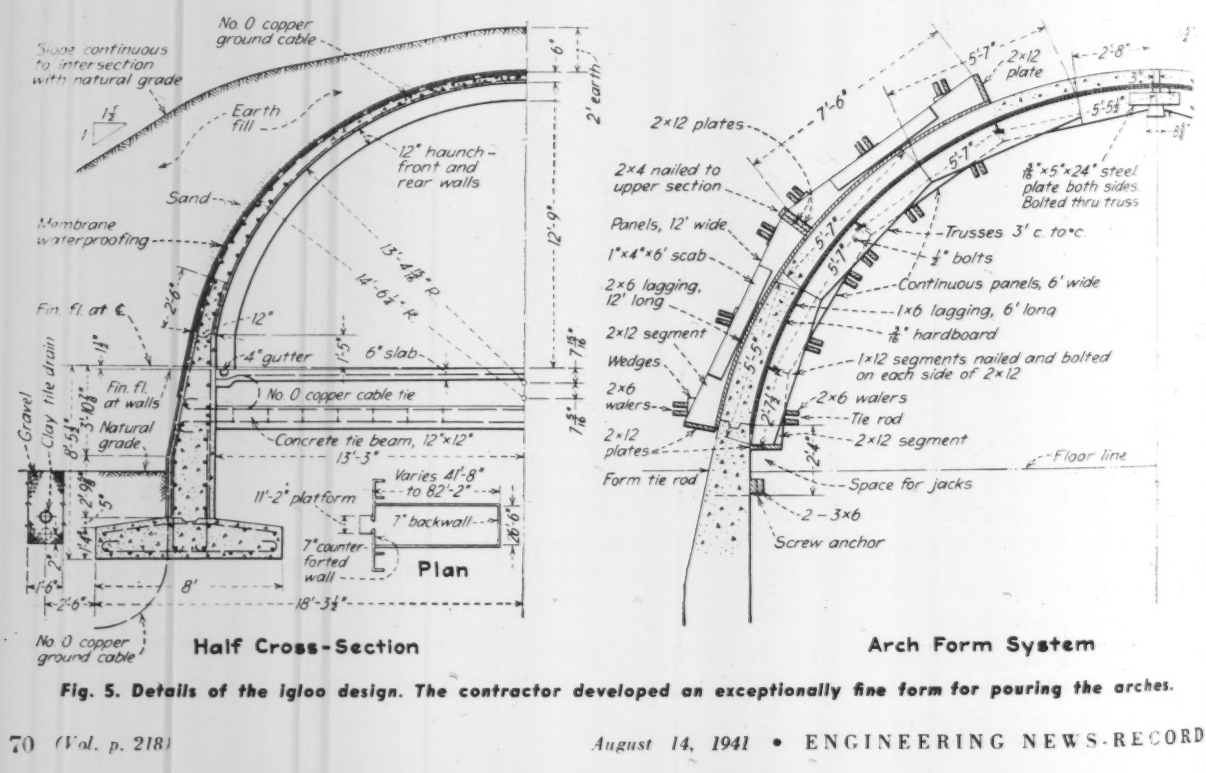


Fig. 5. Details of the igloo design. The contractor developed an exceptionally fine form for pouring the arches.

smooth asbestos sheeting for the walls and corrugated asbestos roofing.

Wood frame, asbestos roof and tile walls comprise the standard design for shop, repair and service buildings. The police station and employment office are all-wood construction.

Construction procedure

Construction operations are highly mechanized, as can be noted from the accompanying list of major equipment (on p. 68), so much so, in fact, that the average working force for all three shifts is only 4,000 men. Equally impressive is the cleanliness of the job. Despite the rush and drive, all trash and waste materials are kept cleaned up, waste is kept at a minimum, roads, yards and shops are maintained in good order. The whole project has an air of business-like efficiency and leaves the unmistakable impression that everyone knows his job and is doing it well.

Construction is divided into two broad phases: (1) buildings and ramps, and (2) roads, railroads, and utilities, each phase headed by a day and night superintendent. Buildings are divided into groups or areas, each having a unit superintendent, and there is also a superintendent for each major engineering construction job, such as roads, railroads, water and sewers. The job works three 8-hr. shifts 6 days a week, with the graveyard shift assigned mainly to cleanup, finishing work not completed by the swing shift, and preparation for the day shift.

As far as possible major materials, such as steel, lumber, asbestos sheeting and tile, are ordered delivered directly to the various units, and are unloaded close to point of use. This saves much inter-job trucking. Each unit also has a warehouse, though miscellaneous and general items are handled through a main storehouse. Highly mobile equipment is serviced and kept, when not in use, at a central pool and repair yard. Heavy units, such as cranes and ditchers, are serviced in the field.

All concrete is mixed at three central plants and is delivered to point of placement by thirty-six 2-yd. truck mixers used as agitators, though on a fast concrete pour some consideration is given to mixing in the trucks, cutting down slightly the time of mixing at the plants. Two plants are equipped with one 1-yd. mixer, their weighing batchers charged by a crane. The third plant has two 1-yd. mixers, charged by a belt conveyor operating in a tunnel under stockpiles. Bulk cement is used at this plant, bag cement at the other two.

Fig. 6. Concrete baffle walls forming bays, to be covered with corrugated sheet asbestos, make up the shell loading stations. The ramp in the lower view will support conveyors carrying material from intermediate powder storage.

At the close of the day shift each unit superintendent reports on his concrete requirements for the next day, and the general field superintendent outlines the start of the next day's pouring operations, assigning truck mixers to each plant and to each pour. This schedule, of course, changes during the day as the various pours are completed or delayed, but reassignment of trucks is simple by radio as will be noted later. All concrete is placed by crane and bucket except in cases of certain foundations and road slabs where the truck chutes can reach the point of placement.

Forms, for the most part, are plywood panels fabricated at a central yard. Foundation forms are standard panels, filled in where necessary to fit particular needs. Big panels for the high walls in the manufacturing bays are also standard. Panels are returned to the form yard after use.

Igloo forms

The forms for the igloo arches are exceptionally fine, so good in fact that many of them were transferred, at War Department direction, to another ordnance plant where similar igloos are being built. The inside arch forms consist of wood ribs placed 3 ft. apart. To each pair of ribs, 1x6-in. horizontal lagging, 6 ft. long, is nailed to make up a panel 6 ft. wide, sheeted with $\frac{3}{16}$-in. wallboard. The ribs are made up of 2x12-in. segments, with 1x12-in. segments, staggered, nailed to each side. Ribs and panels extend in one piece from springline to crown, where the ribs are joined by a wooden key fastened in place with bolted steel plates. The outside of the arches is formed from springline to about three-fourths the distance to the crown by two rows of horizontal panels, each 12 ft. long, made up of 2x12-in. rib segments 3 ft. apart, lagged with 2x6-in. planking, unsheeted. Rods extending through double 2x12-in. wales on the inside and outside forms tie the two together. Details of the arch forms are shown in Figs. 4 & 5.

Excavations for buildings and foundations is done with draglines or trenching machines, if the footing is not too wide. Little general site grading is necessary, but where required is done with the indispensable bulldozers and carrying scraper units, which also build the roads and rail-

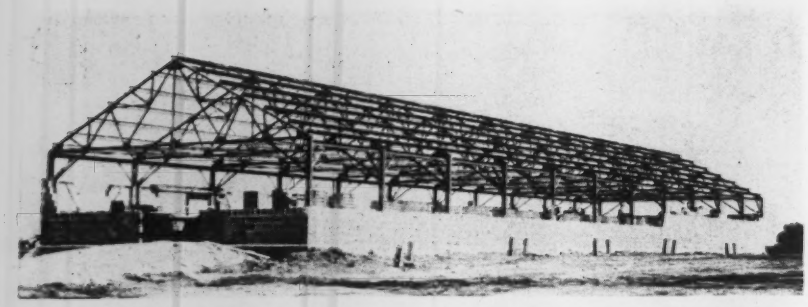


Fig. 7. Steel frame and tile walls are standard construction for finished ammunition storage.

roads. Utility trenches are dug by trenchers or backhoes. In many cases the contractor rushed the railroad grades into an area, then topped them with stone and utilized the grades for temporary roads until time to lay track. Another unusual trick is salvaging of temporary road metal with small bucket loaders for use on other similar roads. Water for the job is supplied by 14 temporary wells and small elevated tanks.

Night lighting

Illumination of the job at night is most effective. Backbone of the lighting system is 60 mobile generating units with a capacity of 420 portable floodlighting standards carrying 780 open-type 750-watt floodlights. Each mobile unit is mounted on a farm wagon trailer, completely housed in. All portable standards served by a unit are hung from racks when the outfit is moved. The units include a 4-cylinder gas engine, connected to a 10-kw. generator. The portable light standards are tripods of 2-in. pipe. The lighting system is augmented by floodlights on each major piece of equipment.

Radio direction

The outstanding feature of the construction procedure is the radio system. Each set is a complete two-way short-wave outfit, powered by a battery. Reception is by loud-speaker in all cases, and talking is through a standard telephone hand set. As all sets are tuned to one wave length, every conversation can be heard over all sets and only one person can talk at a time. The speakers are left tuned in, and the talker can reach any desired person or station by merely calling out the name.

The value and convenience of the radio system is beyond description. A person in the field would be hard to reach otherwise because of the vast area covered and the scattered location of the various units. Questions that would take hours to settle can be cleaned up in a few moments because all concerned can be reached instantly. One of the most effective uses of the radio is in dispatching concrete trucks. As a pour is ready or near completion, the unit superintendent so advises the concrete plant and the general field superintendent, and a new line-up for concreting can be made at once. Listening to the radio for a couple of hours reveals new uses that cannot be imagined. Two parties in discussion, for example, are often overheard by a third party who butts in with the answer. Complaints or directions from the head office to the field superintendent are overheard by the unit superintendents, who act accordingly. Needed plans can be called for in a hurry from the field, equipment can be dispatched as needed, troubles encountered in the field can be discussed with the designing engineers at once and usually some adjustment can be made without stopping work. Truly, the radio offers a fast and complete direction of the big project impossible by any other means.

Accounting

No story of Kingsbury would be complete without mention of the accounting procedure developed by the contractor. First, the contractor assigned his most competent accounting forces directly to the job, supplemented by competent men hired from the outside. Then the contractor determined, through discussions with C.Q.M., just how the war department desired the accounts to be kept and rendered. Of course, being a government job, there is a lot of red-tape paper work to be done, but instead of fighting it, the contractor follows all instructions to the letter. The result is unbelievably prompt payment of accounts by the government, and this big job is actually being handled with less capital than many other defense jobs much smaller. Disputed accounts are almost nonexistent, for the accounting procedure is near perfect. One procedure that saves a lot of headaches is the elimination of freight bills by having all material delivered f.o.b. the job. Contractors doing government work well know the difficulty of getting freight bills made up in proper form for rapid clearance

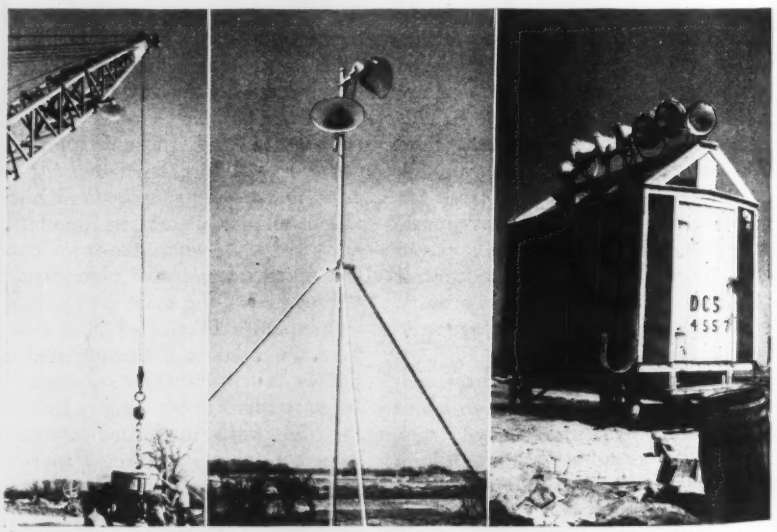


Fig. 8. Three schemes of night lighting. Left: floodlights on equipment units; center: floodlights on portable steel tripod; right: portable generating set mounting floodlights on the housing; they also supply current to the units shown in the center.

Fig. 9. Roads and pipelines are important parts of the project. Concrete for a road slab is delivered from one of the central plants in a transit mixer. A backhoe digs miles of trenches for paper-clad steel water lines.

through the government accounting office.

Direction

The ordnance department is represented by Major W. J. D'Espinosa, commanding officer who will be in charge of the plant. Major Benjamin T. Rogers is constructing quartermaster, assisted by John Stewart, executive officer, and Capt. R. L. Tellman. Lieut. Col. B. F. Vandervoort is zone constructing quartermaster of the 5th Corps Area, which includes this plant.

Chas. W. Cole is resident manager for Giffels & Vallet, Inc., and Chas. W. Cole & Sons, architect-engineer. Todd & Brown, New York, will operate the plant. Their Kingsbury organization is headed by Joseph Brown.

For Bates & Rogers Construction Corp., Chicago, F. L. Copeland is works manager, assisted by E. S. Whitney, general superintendent, and Roy Ross and Geo. Martin, assistant general superintendents. Engineers for the contractor include R. Rasmussen, consulting, Henry Mueller, chief, and John Maxwell, assistant chief. Carl Smith, Lee Bullen and Jas. Strong are assistant general superintendents in charge in the field. D. B. Cassell heads up the office force.

Defense Conditions Emphasize Trailer Regulation Problem

NEW TRAILER POPULATION springing up in defense-industry and army camp areas that are short of housing accommodations are emphasizing the trailer regulation problem for local and state governments, according to a survey by the American Municipal Association. While trailer dwellers have not increased at the rate once predicted, there are about 250,000 houses on wheels now in use, and there are about 2,000 trailer "settlements" in the country. By the end of the summer the federal government probably will own and operate 5,000 additional trailers for emergency housing of defense-industry workers.

The problems of trailer regulation faced by local governments concern health, sanitation, school provision, safety and morals. While some of the municipalities surveyed report satisfactory control of trailers by general ordinances on health and safety, many have enacted ordinances relating specifically to trailer camps. Because many of the trailer settlements lie outside the jurisdiction of municipalities, state regulation also is coming to the fore, the survey showed.

In connection with use of trailers as emergency housing, the federal government is offering suggestions for regulation, the association said. The current edition of the sanitation code drawn up by the U. S. Public Health Service contains a section on trailer camps, and the Division of Defense Housing Coordination has suggested standards for portable dwellings. More recently municipal officials and other authorities with trailer regulation experience have collaborated on a model trailer ordinance designed especially for defense-activity centers. The model ordinance is being distributed by the Consumers' Division, Office of Price Administration and Civilian Supply, Washington, D. C.

Army Starts Campaign Against Mosquitoes

The Army's campaign to eradicate mosquitoes in and near troop centers has been intensified as the result of the appropriation of $1,192,000 for the work in the 1942 Army appropriation bill. Of this amount, $750,000 will be turned over to the Quartermaster Corps and $442,000 to the Medical Department.

The first part of the Army's anti-mosquito program started in April, well in advance of the time of the mosquitoes' "invasion." Breeding was prevented by drainage, or filling, of swamps and seepage areas and by oiling as well as the use of larvicides. There are 53 troop centers having more than 10,000 men each and it is estimated that it will require $250,000 a month to carry out the program successfully.

Soldiers will not be used in this work, all of it to be done by civilian specialists and laborers under the direction of Army personnel. Eighty-seven sanitary engineers, all of them eradication experts, have been assigned to the camps in the various corps areas. These engineers have made plans and surveys and are providing supervision for the eradification efforts.

Plans and general supervision of the anti-mosquito campaign will be the responsibility of the Medical Department while procurement of equipment, supplies and performance of the work will be the job of the Quartermaster Corps.

Chemical Joint Sealing and Soil Solidification

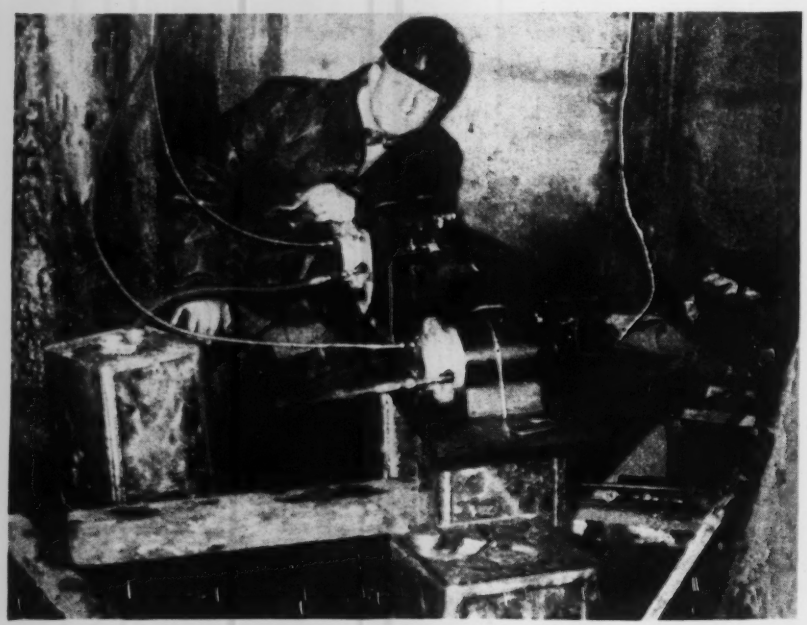
C. Martin Riedel
Civil Engineer, Chicago, Ill.

***Contents in Brief**—Sealing leaky joints in masonry and solidifying loose soils by the application of chemicals are well developed in Europe, but are infrequently practiced in this country. The processes now used in Europe were described in ENR, Aug. 17, 1939, p. 221. The author, who represents the holder of patents to one of these processes, here describes a recent application of that process in Chicago and outlines principles to be observed in its use for soil consolidation elsewhere.*

CHEMICAL SOLIDIFICATION of loose soils, dry or wet, and sealing of joints in leaky masonry have been practiced successfully in Europe for some years. One of the promising methods is the Joosten process, patented in this and other countries by Dr. Hugo Joosten, Dutch mining engineer. During the past three or four years the writer, representing Dr. Joosten in this country, has conducted numerous experiments and tests on this process in both laboratory and field, in collaboration with the Philadelphia Quartz Co., and the Solvay Sales Corp. Results of these tests indicate the chemical solidification process is adaptable to many problems encountered in this country in permanently consolidating troublesome soils encountered in foundation excavation and tunneling; also that it is satisfactory for sealing leaky joints and cracks in concrete and masonry walls and in tunnel lining.

The Joosten process is simple. It consists of consecutive applications, under pressure, of two chemicals into the ground or joint to be treated: (1) a commercial grade of silicate of soda, with certain other chemicals, diluted to the required specific gravity, followed by (2) a strong solution of calcium chloride. The composition and strength of the two chemicals and the proportions used, as well as the method of application, are covered by the patents. Several instances have come to my notice recently where the chemical process has been unsuccessful, but such cases are no doubt due to improper strength or proportions of the two chemicals. As far as the author knows no application of the Joosten process has proved unsuccessful when prepared and conducted correctly.

Unlike cement grout which, for fear of disrupting the mass or separating the cement and water, cannot be forced into all the fine pores and cracks of the material being treated, the chemicals reach into and fill all voids rapidly with an impervious gel that forms as soon as the two chemicals come into contact. This instantaneous action of the gel, together with its steady binding force, is another advantage over slow-setting cement grout.

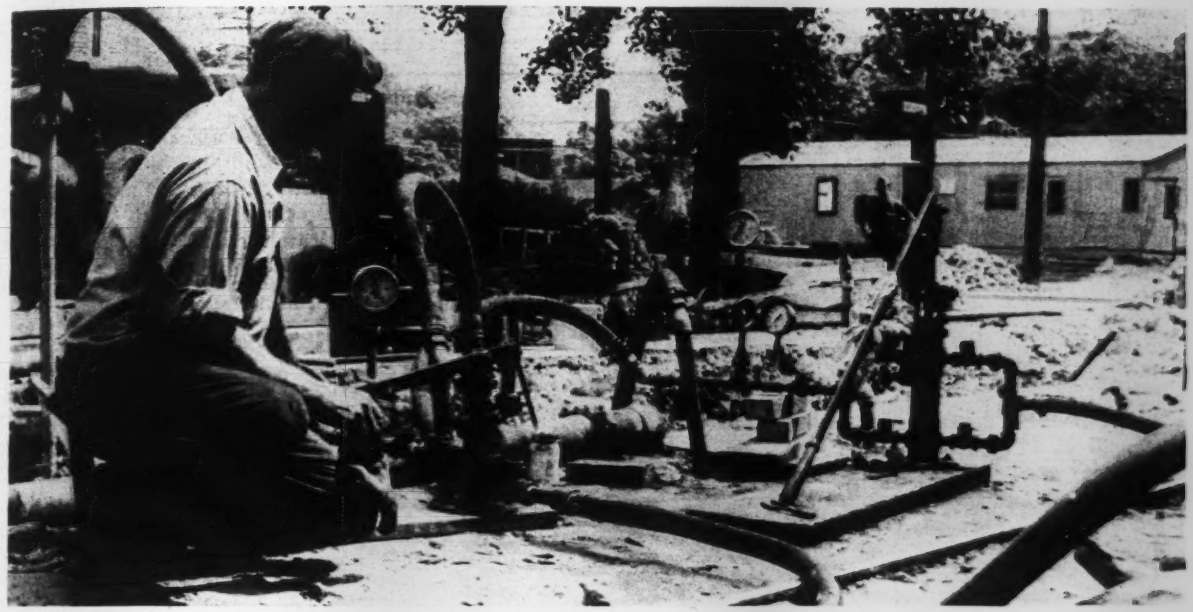


The equipment used in sealing leaky cracks in Chicago Freight Tunnel was very compact. Pumps were powered by a 6-volt automobile battery.

Joint and crack sealing

Just recently the author sealed several badly-leaking joints and fissures in a section of the Chicago Freight Tunnel to demonstrate the effectiveness of the chemical process for such purposes. The section treated was a stub off the Franklin St. tunnel, 41 ft. below the surface and 1½ blocks east of the Chicago River. This stub formerly led to a warehouse, now abandoned, and a concrete bulkhead had been placed 6 ft. from the tunnel line to create a telephone chamber in the old stub section. Considerable water was coming through cracks, seams, joints and even through porous, disintegrated areas in the old concrete lining.

All leaks were effectively stopped by simply drilling 14 holes into the worst spots and applying chemicals by the Joosten process. Equipment used included a small electric-drive air compressor, a pneumatic rock drill with 1⅛-in. bit, two small electric force pumps for handling the



Equipment for soil solidification used in tests of the method on a sewer job through sandy soil in Chicago.

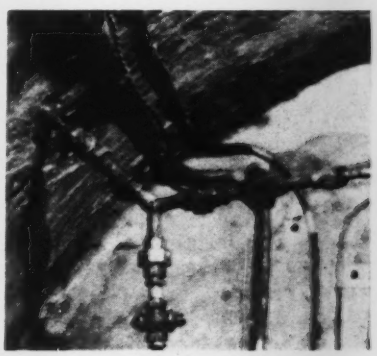
chemicals, powered by a 6-volt automobile battery, copper tubing from the pumps to a Siamese connection leading to a special rubber expanding sleeve wedged into the drill hole, and two 5-gal. cans containing the chemicals.

The holes were drilled and treated one at a time. Records showed the lining had a minimum thickness of 6 in., so the first holes were drilled 4½-in. deep. The last two holes were for a water-bearing seam running in a plane parallel to the roof, only ½ in. from the outer surface. This condition called for a different type of expansion sleeve, but the spot was successfully treated.

After the sleeve was inserted and expanded tight within a drill hole, a shot of the silicate of soda solution was applied, which forced the water out of the seam. Manipulation of the valves on the Siamese connection permitted an application of calcium chloride solution through the same pipe. This was forced in at a higher pressure, and formed the sealing gel within the crack. Though the pumps were capable of 3,000-lb. per sq. in. pressure, actual pressures used were much lower. A momentary pressure as high as 2,000 lb. was found to be effective in forcing the second chemical throughout the seam without disrupting the concrete.

Experience on this job indicates that from 10 to 12 holes per day can be drilled and treated by a crew consisting of a foreman, a compressor operator, a pump man and a laborer, supervised by a field engineer. About 15 gal. of chemical were required for treating the 14 holes, including some spillage, though the amount required would vary with every job.

The success of this sealing in the Chicago Freight Tunnel confirms reports of successful treatment of cracked and leaky masonry in Europe. One example is the case of an old brick foundation for a heavy hoist at a mine in Silesia, which was disintegrating because of shifting ground. Cracks up to ¾ in. wide were opening up in the brickwork, and the whole foundation was shaking under the vibration of the hoist. Without interrupting hoisting operations, injection holes were drilled in various planes intersecting the cracks. Then the wider cracks were filled with sand and cement slurry, followed by the two chemicals of the Joosten process. This preliminary treatment stopped the shaking after which the finer cracks were treated with chemicals, and no further disintegration of the foundation has occurred. Chemical sealing of leaking pores and fissures in deep mines and shafts under high water pressure is now routine treatment in many parts of Europe. Tests both here and abroad show that acids or mineral waters in the soil do not affect the sealing compound.



Siamese connection through which the two chemicals are pumped into hole drilled into wet spot.

Soil solidification

An even more important application of the Joosten process is that of solidifying loose or fractured ground, both wet and dry. The practice has become common in Europe since 1928, and European experiences have been borne out by tests made by the author in this country.

To inject the chemicals 1-in. pipes of high-grade steel, with perforations near the end and fitted with a driving point, are driven into the ground to the elevation to be treated. The spacing of the pipes varies from 22 to 30 in. according to the character of the soil. A well worked out and carefully supervised plan for driving the pipes and injecting the chemicals must be followed to insure uniform solidification at the desired location. Two high-pressure double-acting pumps, one for

each chemical, are required for the injection. Preferably these should be multi-stage pumps operated electrically or by compressed air; the size of the units depends on the magnitude of the job.

The solidified material can be compared with medium hard natural sandstone. John Mowlem & Co., Ltd., London engineers and contractors, who have been using the process for some time in subway and large sewer construction, found that the samples of solidified soil crushed 30 min. after injection of the chemicals showed a crushing strength of 247 lb. per sq. in., or 15.9 tons per sq. ft. A sample two days old showed a crushing strength of 19 tons per sq. ft. This particular ground was London "ballast" containing about 24 percent silt and clay. Soil with less clay and a higher content of quartz sand would give a much higher crushing strength. London "Leighton Buzzard" sand, solidified and tested 11 weeks after injection, crushed at 715 lb. per sq. in. or 46 tons per sq. ft. These test results have been verified by tests conducted by the writer in Chicago with various kinds of natural soil. A sandy soil treated at a sewer project at 73rd St. and Merrill Ave. at a depth of 12 to 14 ft. below the street and several feet below groundwater level, showed compressive strength of 49 tons per sq. ft.

Sample of fine wet sand treated by chemical injection. Resulting material resembled sandstone in hardness.

As to permeability, curtains of solidified sand not less than 3 ft. thick are a reliable protection against penetration of water. A 3-in. [illegible]fied specimen of solidified sand taken [illegible]om the 79th St. beach, Chicago, abs[illegible]bed 8 percent of water within 4 [illegible]ours. This percentage decreased to [illegible] percent after 24 hours. This com[illegible]red with the permeability of Lak[illegible] Superior sandstone, for example, a[illegible] follows: 7 percent for the first day, [illegible]radually increasing to 8 percent on the thirteenth day, without any further increase.

Adaptations of the Process

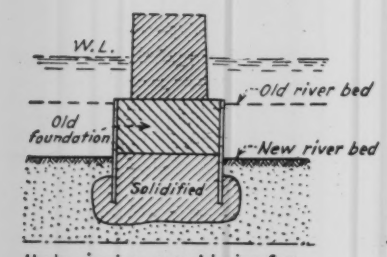
Based on European practice and tests in Chicago chemical solidification and sealing could be applied:

1. To tunneling through soft ground or water-bearing materials, or where a fault zone is encountered. Use of compressed air is unnecessary to tunnel such ground, for a shield of chemically solidified soil at the head or arch above the roof will eliminate the danger of running ground and will seal and strengthen faulted planes.

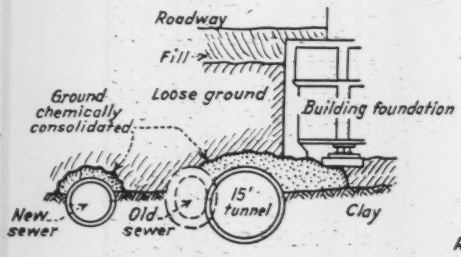
2. As a method of underpinning without excavation, particularly in city sewer and utility construction below groundwater level where it is difficult to excavaate without endangering adjacent buildings.

3. Under column and pier footings of existing buildings or bridges to be rebuilt for carrying greater loads.

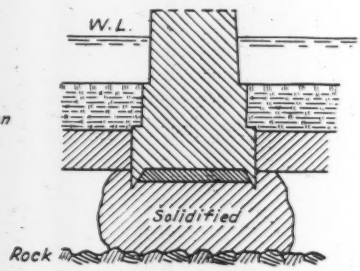
4. To strengthen decomposed, frozen or weak concrete bearing walls



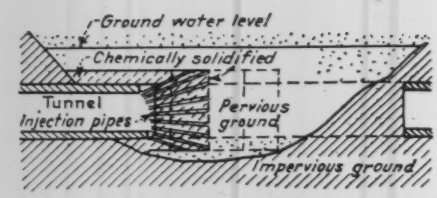
Underpinning an old pier for lowering of river bed by dredging



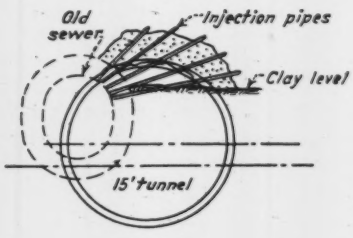
Underpinning a building for tunnel construction



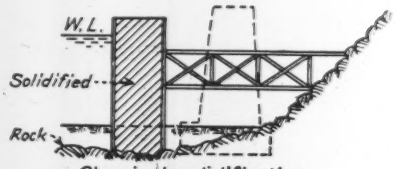
Chemical solidification in pneumatic caisson work



Chemically solidifying a tunnel heading



Consolidated arch over 15' tunnel formed by pipes driven from old sewer



Chemical solidification of a cofferdam

Typical examples of chemical soil solidification as applied to difficult construction operations in Europe.

by injecting the chemicals under high pressure.

5. In sealing water-bearing fissures in rocks, especially where cement grouting has not been successful.

In general, the following materials are suitable for chemical solidification:

(a) Loose, not too fine sand, dry or under water pressure; (b) layers of sand and gravel with a limit of clay content about 20 percent, since clay cannot be impregnated; (c) other diluvial or alluvial soils shown suitable by laboratory tests; (d) quicksand, even under high water pressure; (e) poor, pervious concrete or brickwork.

Cost of the process

Because of varying circumstances the cost per cubic yard of solidified material can be estimated only after a careful study of the kind and size of the job, the local and geological conditions and the character of the material. However, experience has shown that the cost of chemical solidification is low in comparison with other methods required to handle troublesome ground.

Investigation of soil behavior in relation to the structure to be built has become increasingly important in the last few years. Greater knowledge of the limitation of building ground as obtained by intensive laboratory work led logically to a new art of artificially improving soil to suit certain difficult conditions with the objective of obtaining greater stability, safety and economy. Much is yet to be learned about difficult soils, like clay, for example, and much closer cooperation between the engineer, the contractor and the laboratory is essential.

Limitations on the method

The author believes that chemical solidification of soils will become increasingly important in the field of soil and foundation treatment. However, it must be understood that this method of transforming loose soils into a stone-like impervious material is by no means a panacea for all difficult foundation work or water control problems. It is not a competitor of concrete or cementation work, and Dr. Joosten himself advises the use of concrete wherever concrete will satisfy the conditions, and also uses cement grout wherever that material is suitable. He claims, however, that his process will bring desired and lasting results in special cases when other means fail, provided that geological and other conditions for the use of chemicals are favorable and the process is applied correctly.

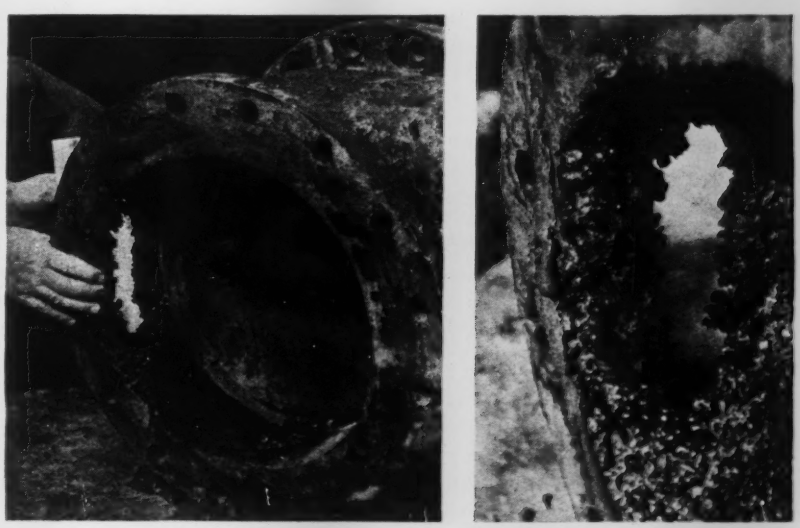
Severe Cases of Pitting In 12-in. Gate Valves

DESTRUCTIVE PITTING on the discharge end of 12-in. gate valves has made it necessary to replace eight such valves in the water supply system serving San Francisco. This pitting effect, known to be a possibility wherever there is a partial vacuum in metal pipes and passages, is much more common in pump and hydraulic turbine runners than in valves of a water system. The more commonly accepted explanation of the pitting action itself is that the presence of vacuum creates a tendency to draw oxygen out of entrapped air. This nascent oxygen in the partial vacuum has affinity to a high degree for metal. The resultant metallic oxides are quickly carried away by the water current leaving the surface with characteristic sharp points, as though eaten away by strong acid.

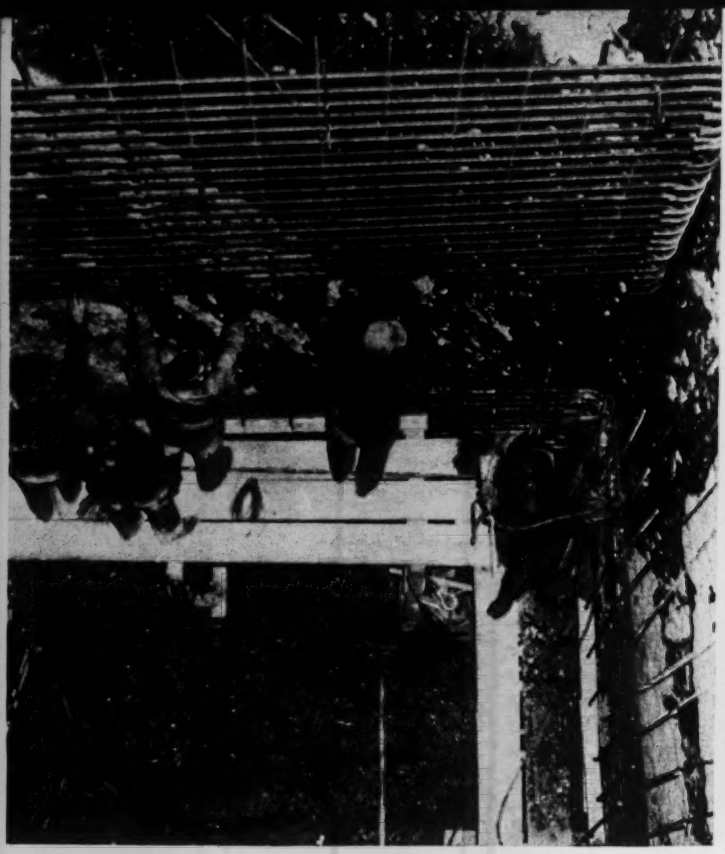
Anticipating the danger of pitting in eight 12-in. gate valves of the San Francisco water system that supply a 20-nozzle aerator at the Calaveras Reservoir, a single cone valve was placed in the main upstream from these valves. The intent was to do all the regulating in the cone valve and to operate, ordinarily, with the gate valves wide open. The arrangement for venting the cone valve caused vibration, however, and its use was discontinued as a result of which the gate valves have since been used for regulation.

The flow has continued about half the time since the valves were installed some 9 years ago and the usual valve opening has been only 2 or 3 in. Thus, there has been a strong tendency to form a vacuum on the discharge side of the valve. The disintegration pictured has developed slowly through the years and leakage increased until the valves recently had to be taken out and repaired. Water passing through the valves has been generally clear; oxygen saturation usually 70 to 80 percent; pressure on the upstream side of the valve, 50 to 60 psi.

As a remedy, in the repaired valves a short sleeve is inserted into the line next to the valve flange on the discharge side, and from the sleeve a vent will lead to a 3-in. vent pipe, thus admitting air that is expected to prevent formation of the vacuum.



A 12-in. gate valve in which pitting action has eaten entirely through the metal at the bottom of the valve (discharge side). At right: close view of the pitted area. Note sharp, spicular nature of the metal—a strong contrast with the result of wear by abrasion.



Prefabricated steel mats for reinforcing are lowered into position by bridge crane, and then spot-welded.

Concrete is dumped by bucket on deck floor of moving form and then distributed by shovel.

Sliding Form Used to Construct Walls of

To Expedite Installation by the Ordnance Department, U. S. Army, at the Watervliet (N. Y.) Arsenal of an additional furnace capable of heating guns as large as 16 in., a very unusual sliding form was employed in building the 77-ft.-deep pit required. The furnace, which is set below ground level and adjacent to another furnace, is 72 ft. deep with an outside diameter of 10¾ ft. and an inside diameter of 8½ ft. The necessary pit was excavated in shale rock with pneumatic pavement breakers and hand labor. Explosives were tried but offered no special advantages and in addition seemed capable of misaligning nearby large machine tools.

Because of the speedy construction required for completion of the furnace four months after it was proposed, it was decided to use a sliding form similar to that used for reinforced-concrete silos, rather than pour the pit walls in successive lifts. However, the form, which eliminated construction joints, had to be unusual in that the pit was open on one side for the entire 77-ft. depth and above the 36-ft. level was open on two sides.

It was necessary to modify the design usually used for silos, in which a double form is lifted by a jack pushing up on a yoke connecting an inside and outside form, as here only the inside form was required. Steel reinforcement was in two layers requiring special yokes for form lifting.

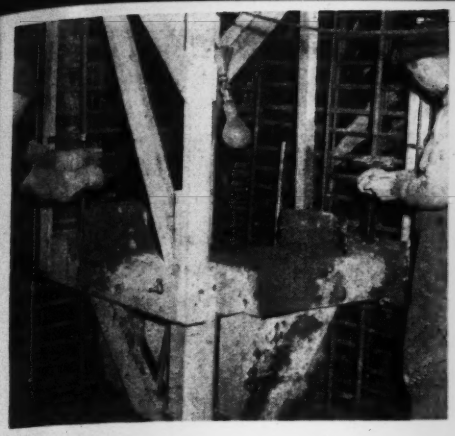
The form adopted was 4 ft. high, as is common with silo work. Upward movement of the form was accomplished by nine hand-operated screw jacks each working on a 1-in. steel rod which was embedded in the concrete as the work advanced. The jack rods, held in position by hooked stirrups at about 12-in. intervals, had to be placed very close to the inside surface of the pit walls to allow clearance for the reinforcing steel.

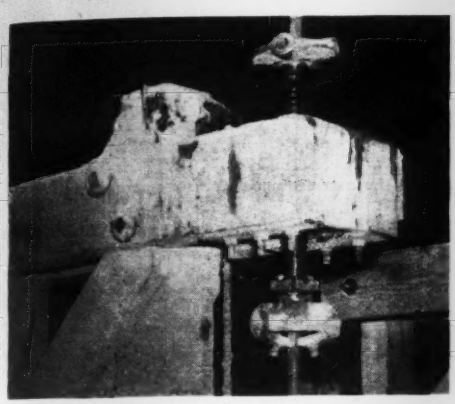
Another interesting feature was the platform above the form to aid in setting steel and the two successive platforms below the form to provide working room for the finishers.

So far as possible the reinforcing steel was prefabricated by electrically welding it into mats the full width of the pit. The mats were then lowered into place by an existing bridge crane and spot-welded when in position. However, the steel for the inner layer of reinforcing had to be laid one bar at a time because the use of prefabricated mats would have interfered with operation of the jacks.

The concrete was a 1:2:3½ mix and a regular cement was used. The concrete for the bottom of the pit was poured first. The pouring of the walls started Mar. 24 and was finished Mar. 28 after 116½ hours of continuous work. The maximum lift in any 12-hr. period was 10.4 ft. and the minimum 7.0 ft. Concrete was delivered in buckets lowered by the bridge crane.

The thrust on the side open for the full height of the pit was resisted by railroad rails welded to the steel supporting an adjacent elevator and stairway, and the rod for the form's screw jack on this side was supported by a 4x4-in. timber to which the rod was bolted every 18 in. by hook bolts. On





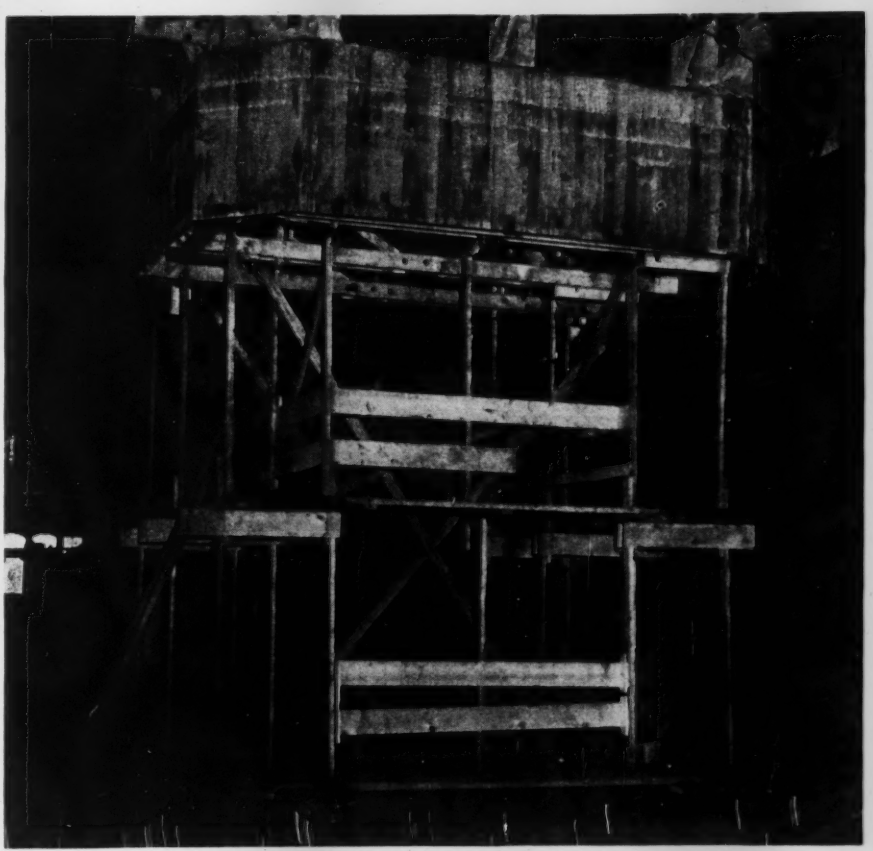
Raising of form by screw jacks is shown at top. Lower photo gives jack details.

Moving form is jacked out of pit as concreting of pit walls is completed. Note shape of form and spacing of screw jacks.

77-ft. Pit

the side open above the 36-ft. level, the yokes were cut off and the jack rod discontinued: the thrust was resisted by wooden slides and no jacks were employed. A chain fall suspended at floor level was used to hold and raise the form at the open corner.

The design and construction supervision were carried out by L. A. Maciula of the Watervliet Arsenal plant engineering department, under the direction of Capt. H. L. Bartholomew, service and maintenance officer, and W. F. Dralle, plant engineer. E. W. Wendell, assistant chief engineer, New York State Department of Public Works, acted as consultant. W. B. Neill Co., New York, which designed and supervised construction of the form. L. Felts was designing engineer. J. A. Plummer, secretary and superintendent of construction with the Neill firm, constructed and tested a model of the form before the operations were begun. Bob Durham represented W. B. Neill Co. on the job and supervised the building and operation of the form.



Here sliding form has been lifted from pit by bridge crane and set on shop floor for dismantling. Platforms for finishers are still in place.

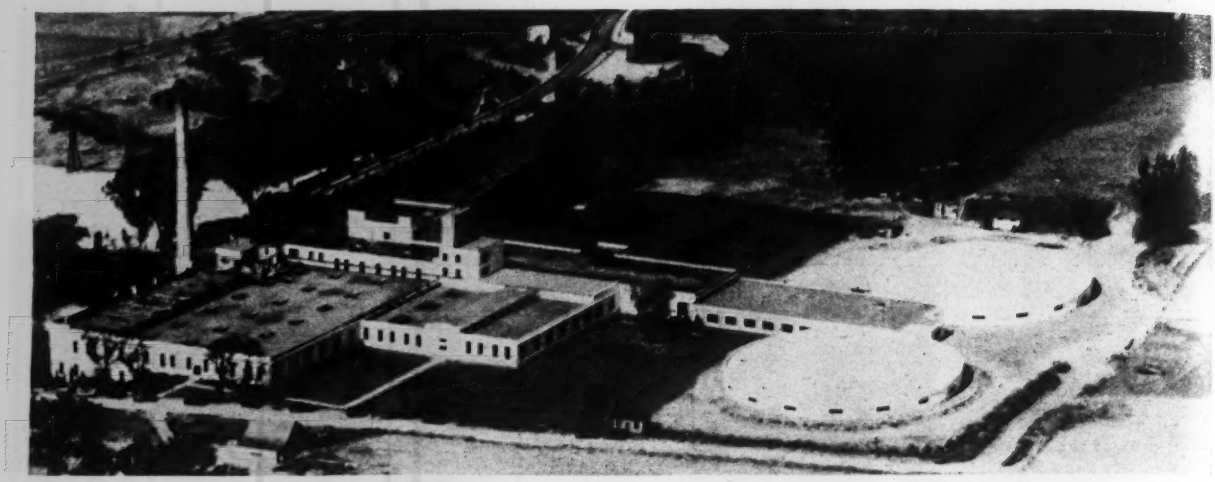


Fig. 1. St. Paul's water treatment plant, where a large saving results from use of the lime-soda process for softening.

St. Paul Softens Water Cheaply

Ross A. Thuma

Superintendent of Filtration
Department of Water, St. Paul, Minn.

***Contents in Brief**—Average hardness of St. Paul water supply is reduced 87 ppm. by the lime-soda process at a cost for chemicals of $3.51 per million gallons. When softening operations were started considerable scale was removed from distribution and plumbing piping but after six months this trouble disappeared and softening won wide public approval.*

PLACED IN OPERATION early in 1940, the new softening plant of the St. Paul, Minn., water system has won wide approval by reducing the water's average hardness 87 ppm. at a cost for chemicals of $3.51 per million gallons. What this means to the consumer is a saving of nearly $15 in soap requirements per million gallons of water used, plus all the other advantages that are apparent in the use of softened water for domestic and industrial services.

The city's supply is obtained from the Mississippi River at a point some 16 miles northwest of St. Paul. Water, which is pumped from the river, reaches the purification plant by way of thirteen miles of conduit, three miles of open canal and four storage lakes. The latter have a capacity of six billion gallons, and runoff from their watersheds, which total 29.2 sq.mi., is sufficient to replace seepage and evaporation losses.

Before reaching St. Paul the Mississippi travels about 535 miles with its increasing flow derived from tributary streams, lakes, swamps, sloughs, underground sources, and runoff from farm communities. At the pumping station the water is moderately hard, low in turbidity, and of comparatively high color throughout the year. Records of the past sixteen years reveal that the minimum monthly average hardness was 119 ppm. (In July, 1929) and the maximum was 253 ppm. (in January, 1940). Average hardness during 1940 was 178 ppm. at the river intake; while for the same period the plant influent averaged 168 ppm. Of the 178-ppm. total hardness, 19 ppm. or a little more than 10 percent was of the non-carbonate variety. Removal of bicarbonate hardness by use of lime only reduced the hardness to an average of 85 ppm., and a somewhat lower hardness is expected in the future. Water softened during 1940 totaled 8½ billion gallons.

Enlargement and improvement of the filtration plant to provide for softening (see *ENR*, June 8, 1939, p. 792 for details of plant facilities) was completed late in 1939 and softening of water began in January, 1940. The purification plant (Fig. 2) is equipped with duplicate weighing machines for alum application and for weighing and slaking the lime for softening. After the chemicals are added the water is aerated with compressed air for odor removal and then passed through an over-and-under type of baffle, followed by mixing in a flocculator. Sludge is separated and removed by two 150-ft.-dia. clarifiers with a portion pumped to the point of application of the lime and recirculated until the sludge reaches sufficient concentration for removal from the plant. Recirculated sludge is pumped by a plunger-type pump operating continuously, while the concentrated sludge is delivered from plant to sludge field by a centrifugal pump operated at intervals as required.

Stabilization of the water is accomplished with carbon dioxide obtained from the stack gases of the power plant and then purified by scrubbing and drying. Carbon dioxide gas is introduced into the water

at two points: (1) to water flowing from the clarifiers; and (2) into clear well water. For ammonia treatment ammonium sulphate is applied before filtration; chlorine is added in the clear wells.

Return sludge saves lime

In the softening process sufficient lime of 92-percent calcium oxide is used to eliminate bicarbonates of calcium and magnesium, and to produce an overtreatment of from 15 to 30 ppm. caustic and normal carbonate hardness. Returned sludge is mixed with the lime suspension and the mixture then applied following aeration. Sludge recirculation results in a 12 to 15-percent saving of lime. Since the chemical analysis of the recirculated sludge shows the active lime content is nil, the function performed by the recirculated sludge in reducing the lime requirement is not apparent.

After the lime has been in contact with the water from 5 to 10 minutes, aluminum sulphate (for coagulation) is added. The water is recarbonated for stabilization as it leaves the clarifiers. The carbonation is sufficient to reduce the pH to 9.0 as the water is delivered to the filters. Reduction of the pH to 9.0 is expected to reduce to a minimum the chances of deposits on the filter sand, and observations seem to indicate that such is the case.

Further recarbonation of the water in the clear wells and reduction of the pH to 7.5 follows. This is for two purposes: (1) elimination of normal carbonates, thereby reducing to a minimum the possibilities of deposits; and (2) removal of causticity to make the water more satisfactory for drinking purposes. Water with caustic alkalinity is undesirable as a drinking supply because it tends to extract moisture from the mucous membrane of the mouth and produces a sensation of thirst. Unfavorable comments directed at the water for its inability to quench thirst disappeared when the water's reaction was placed at pH 7.5 and the normal carbonates practically eliminated. The scheme of recarbonation treatment at two points results in the minimum change in the water's chemical components and, therefore, the most satisfactory general supply.

Results of the softening treatment are shown in Table I, which gives a complete picture of the chemical components of the water upon removal from the river, arrival at the plant, and delivery to the city mains. An average pH value of 8.2 for the water delivered to the city mains, as revealed by Table I, resulted from insufficient reducing gas at times, and a policy of carrying a higher pH through the earlier months of softening. In the future a pH of 7.5 will

TABLE I—AVERAGE CHEMICAL WATER ANALYSIS

During 1940 at river intake, plant influent, and plant effluent.

Determination	Mississippi River	Plant Influent	Plant Effluent	Lake Storage Percentage Gain	Lake Storage Percentage Loss	Lake Storage and Plant Treatment Percentage Gain	Lake Storage and Plant Treatment Percentage Loss
Temperature C.	10.9	10.5	11.0	..	4.7	1	..
Odor at 90 C.	2.47	2.50	0.46	1	..	..	81
Turbidity	6	4	0.33	..	33	..	95
Color (apparent)	46	27	8	..	41	..	83
Ammonia nitrogen	0.035	0.033	0.050	..	6	45	..
Albuminoid ammonia nitrogen	0.453	0.354	0.229	..	22	..	52
Nitrite nitrogen	0.008	0.007	0.019	..	13	138	..
Nitrate nitrogen	0.051	0.052	0.031	2	..	..	39
Oxygen consumed	10.5	10.6	6.1	1	..	..	42
Oxygen dissolved	9.5	9.6	9.4	1	..	..	1
Alkalinity — total	169	152	61	..	10	..	64
Normal carbonates	4	4	5	..	..	..	25
Hydrogen ion-pH	8.1	8.2	8.2	1	..	1	..
Free carbon dioxide	1	.....	.....	..	100	..	100
Residue on evaporation 105 C.	235	203	121	..	14	..	49
Loss on ignition	95	80	47	..	16	..	51
Non-volatile salts	148	124	74	..	16	..	50
Silicon-Si	4.34	2.24	1.75	..	48	..	60
Manganese-Mn	0.16	0.05	trace	..	67	..	100
Iron-Fe	0.36	1.12	trace	..	67	..	100
Aluminum – Al	0.44	0.38	0.49	..	14	7	..
Chlorides – Cl	2.86	2.75	3.59	..	4	25	..
Calcium – Ca	46.98	39.87	17.15	..	15	..	64
Magnesium – Mg	17.37	16.82	9.51	..	3	..	45
Sulphur – S	6.27	5.88	7.81	..	6	25	..
Sodium & Potassium as Na	7.19	4.77	5.81	..	33	..	19
Temporary hardness – $CaCO_3$	169	152	62	..	10	..	63
Permanent hardness – $CaCO_3$	24	20	23	..	17	..	4
Total hardness – $CaCO_3$	192	172	85	..	10	..	57

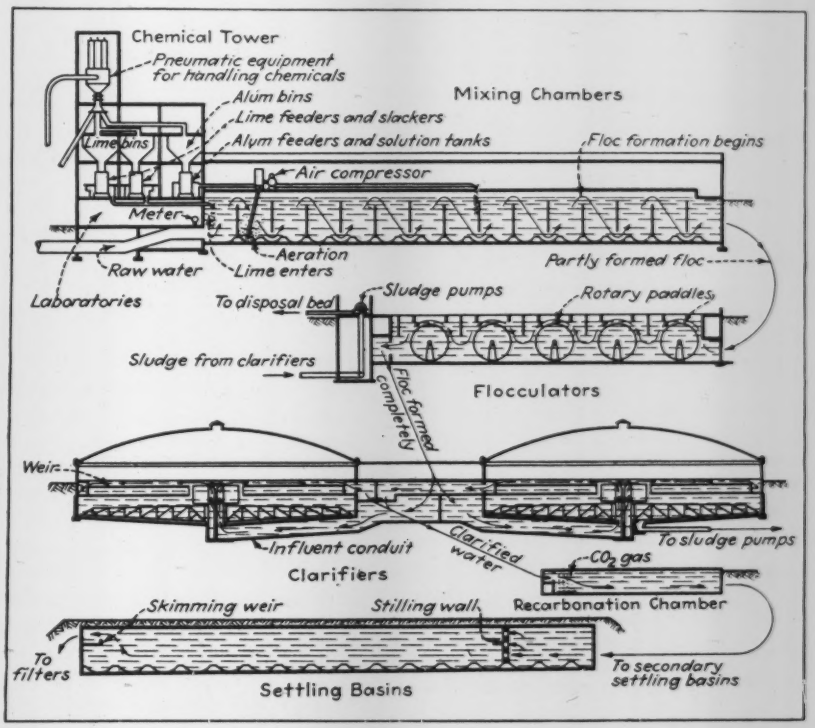


Fig. 2. Softening treatment preliminary to filtration. Lime-soda ash method is employed and water is conditioned in mixing chamber and flocculation.

be used for the reasons mentioned above.

Reaction of the softened water from the standpoint of corrosion of metals has received considerable attention both in the laboratory and throughout the system. The water's conduct in depositing scale and removing old deposits was shown nicely by a Barnsdall laboratory still set up at the plant. Before the water softening started the custom had been to remove the scale from the still's heating elements and compartments every 30 days. The scale was a hard, resistant deposit of calcium carbonate and sulphate, which could only be removed either by a cold chisel or dissolving acids. Thirty days after use of the softened water the scale was dissolved from the still's interior and the electric heating elements without appreciable effect on the metal. Insofar as could be determined, the softened water prevented further scale deposit.

Old corrosion causes trouble

Introduction of the softened water into the distribution system dissolved and broke loose a quantity of the old calcium carbonate scale laid down by previous hard water. Considerable plugging of plumbing fixtures (particularly in heating coils and other low or constricted points) resulted and at times this became so severe that plumbers were required in many instances to clean out the piping. Such trouble was not only annoying and expensive, but created an unfavorable impression of water softening. However, the situation gradually cleared and six months after softening started the difficulties were gone and the trouble pretty much forgotten.

Occasionally a consumer would be using the supply in connection with some process requiring a water of definite hardness. Accordingly, when the hardness was reduced, the process required revision. In other cases institutions using zeolite softeners reported their plants ran two or three times as long before regeneration was necessary. Soap requirements were cut about one-half by the softening, boiler compounds decidedly reduced, and sludge deposits upon evaporating the water lowered 50 percent.

Softening costs small

Cost of chemicals for 1939 and 1940 are given by Table II. Since softening did not start until January of the second year the difference in these costs, $3.51 per million gallons of water treated, can be used as the added cost of chemicals for softening. Total hardness of the water entering the purification plant in 1939 was 176 ppm. as against 172 in 1940. Total average hardness in 1940 was reduced 87 ppm.

TABLE II—EXPENDITURES

For chemicals before and after softening started.

Chemical cost for 1940 per million gal. are:	
Aluminum sulphate	$1.29
Ammonium sulphate	0.08
Liquid chlorine	0.18
Lime (CaO 92%)	3.52
Phosphorous (Calgon and Nalco 918X experimental)	0.19
Recarbonation	1.00
Total	$6.26
Cost of chemicals for 1939 were:	
Aluminum sulphate	$2.29
Ammonium sulphate	0.07
Liquid chlorine	0.39
Total	$2.75

Benefits derived by a community from softening are difficult to reduce to figures. However, it has been shown that a yearly saving of fabrics up to 25 percent of their value is possible. Reduction in fuel consumption at power plants by reduction of the water's dissolved salts and change in their composition also has been illustrated. That savings in labor result as a softening by-product is likewise apparent.

Reduction of soap consumption and the resultant saving to a community softening its water supply has been estimated in a number of ways, and in almost every case such analysis indicates satisfactory returns for the softening cost. In reducing the hardness of the St. Paul supply 87 ppm. in terms of calcium carbonate, 725 pounds of this material was removed for each million gallons of water treated. The sodium stearate equivalent of 725 pounds of calcium carbonate is 4,400 pounds, showing that over 4,400 lb. of soap would be required to accomplish the softening effected by $3.51 worth of lime. An estimate of the soap saving requires assuming values for the following three factors, namely: (1) percentage of water used requiring soap; (2) cost of soap to consumer; and (3) percentage purity of soap in relation to pure sodium stearate.

For estimating the saving in softening at St. Paul assume: soap is used with 2 percent of water consumed; soap costs consumer 15c. per lb.; and soap's sodium stearate content is 90 percent. Then, removing 4,400 lb. of sodium stearate would cost:

$$\frac{4{,}400 \times 0.02 \times 0.15\text{c.}}{0.90} = \$14.75$$

Thus, soap saving under the above assumptions would be $14.75 per million gallons of water softened. Stated in another way, for $3.51 invested in lime for softening a saving of $14.75 for soap alone accrues to the citizens of St. Paul. That this saving does not exceed one-half the total savings from softened water is apparent. Hence, the total value of softened water to a community might be rated very high in comparison with the softening cost. Certainly, the value of a softened supply for St. Paul citizens is many times the softening cost.

The writer expresses his appreciation to the Board of Water Commissioners, and to Leonard N. Thompson, general superintendent of the water department, for the use of the data contained in this article.

Water Supply Service Is Big Business

Supplying water to residents of large cities is one of America's big businesses, according to Census Bureau reports, which indicate that all but eight of the 92 cities of more than 100,000 population now own and operate their water supply systems. According to J. C. Capt, director of the census, the annual income of the water systems in these 84 cities is in excess of 199 million dollars. Customers paid $185,326,000 of this total, with earned interest, federal grants, and contributions from general city funds making up the remainder.

Annual payments for supplying water in the 84 cities amount to $209,277,000 with general operating expenses accounting for $74,502,000 of the total. Capital outlays amount to $63,331,000, financed in part from current revenues and in part from proceeds of bond issues. Interest payments, contributions to general city funds, and pensions are other important cost items.

Birmingham, Bridgeport, Chattanooga, Gary, Indianapolis, New Haven, Scranton, and Peoria are the only cities of more than 100,000 population which do not own and operate their water supply systems.

Keeping Costs on Hired-Out Shovels

Arthur Whitcomb
General Contractor, Keene, N. H.

***Contents in Brief**—Owner of largest fleet of shovels in New Hampshire explains how his cost records stop losses, tell when to dispose of equipment and guide in buying new shovels. Simple cost system reveals profit made by each shovel based on a flat hourly rental charge.*

OUR BUSINESS is to hire out power shovels and every one of our nine shovels has to make us a profit, or else. We must know the earning power of each shovel because the business is based on a policy of making money on a flat hourly rate for the use of machinery, rather than on the performance of a certain amount of work. The simple cost-record system described here reveals the figures we use to guide our course.

Our business was started in 1931 with a ¾-yd. shovel. I was the proprietor, shovel operator and sole employee. The shovel was bought with a down payment of $1,000 (borrowed) plus a flock of notes to be paid off at the rate of $500 a month. I hardly got the first shovel paid for before I bought another. There never seemed enough cash left over to live on: something always happened that made it necessary to spend the money for repairs or replacements.

How cost keeping started

Cable breakage was the biggest single item. Both shovels had small sheaves and reverse bends that were cable wreckers. So I started experimenting with different types and makes of wire rope. In a cupboard, built in the shovel cab where I worked, I kept a big sheet of yellow paper on which I entered the make, length, size, construction and type of each wire rope used; made notes of the kind of work the shovel was doing and finally was able to get satisfactory figures on the cost per working hour of several wire ropes. It happened that a certain make of preformed Lang lay wire rope, although slightly higher in first cost, was least expensive per working hour.

That big sheet of yellow paper, well smudged with oil and grease, gave me the facts I needed to save thousands of dollars on wire rope and started me making a separate record of costs for each machine as the costs were incurred. It was the nucleus of the present cost-record system developed with my associate, G. Allen Mott.

From the very beginning our cost

TABLE I—TYPICAL MONTHLY-YEARLY RECAPITULATION SHEET ON ONE SHOVEL (No. 6) COVERING THE YEAR 1940

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total for year	Average per hr. worked per year
Hours worked	14½	17½	7½	85	161½	164½	180	166	105	171	96	46	1,214½	.....
Income	87.00	105.00	45.00	510.00	969.00	987.00	1,080.00	996.00	630.00	1,026.00	576.00	276.00	7,297.00	6.00
Gasoline	6.30	8.05	3.45	36.20	74.40	71.35	84.30	44.05	38.50	66.00	32.73	26.15	491.48	.40
Oil and Grease	1.20	3.60	7.28	4.83	4.80	6.03	6.30	6.04	2.40	3.00	3.30	1.05	49.83	.04
Operator	9.66	11.66	5.00	56.66	142.87	139.92	162.39	176.83	145.08	146.52	115.50	111.88	1,223.97	1.01
Repair labor	2.00	.....	11.10	3.90	18.81	26.33	10.00	78.81	12.57	59.43	38.11	19.62	280.68	.23
Repair material and parts	1.00	1.13	.....	12.00	7.08	150.89	26.24	25.13	14.39	58.10	67.70	1.54	365.20	.30
Moves	.....	.....	.....	.....	.....	.....	10.00	15.00	.....	.....	7.50	25.00	57.50	.05
Pick-up truck	22.03	.....	.....	14.35	69.55	101.81	20.79	21.40	34.28	31.66	25.62	16.56	358.05	.30
Overhead and insurance	122.77	72.66	82.53	50.93	38.53	83.48	59.55	19.11	102.74	52.73	41.76	70.14	796.93	.66
Total expense	164.96	97.10	109.36	178.87	356.04	579.81	379.57	386.37	349.96	417.44	332.22	271.94	3,623.64	2.99
Total profit per year	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,663.36	———
Profit or loss per month	*77.96	7.90	*64.36	331.13	612.96	407.19	700.43	609.63	280.04	608.56	243.78	4.06	.....	———
Profit of shovel to date (was $1,804.83 for 1939)	1,726.87	1,734.77	1,678.41	2,001.54	2,614.50	3,021.69	3,722.12	4,331.75	4,611.79	5,220.35	5,464.13	5,468.19	.....	———
Average hourly income	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	.....	———
Avg. costs per hr. worked														
Gasoline	.43	.46	.46	.43	.46	.43	.47	.27	.37	.39	.34	.57	.....	———
Oil and grease	.08	.20	.97	.05	.03	.04	.03	.04	.02	.02	.03	.02	.....	———
Operator	.67	.67	.67	.67	.88	.85	.90	1.06	1.38	.86	1.20	2.43	.....	———
Labor for repairs	.14	.....	1.48	.05	.12	.16	.06	.47	.12	.35	.40	.43	.....	———
Repair material and parts	.07	.06	.....	.14	.04	.92	.15	.15	.14	.34	.70	.03	.....	———
Moves	.....	.....	.....	.....	.....	.....	.06	.09	———	.....	.08	.54	.....	———
Pick-up truck	1.52	.....	.....	.17	.43	.62	.11	.13	.33	.19	.27	.36	.....	.....
Overhead and insurance	8.47	4.15	11.00	.60	.24	.51	.33	.12	.98	.31	.44	1.53	.....	.....
Avg. total cost per hour	11.38	5.54	14.58	2.11	2.20	3.53	2.11	2.33	3.34	2.46	3.46	5.91	.....	.....
Average profit per hour per yr.	.....	———	.....	———	———	.....	.....	.....	.....	.....	———	———	.....	3.01

* Loss.

records were profitable, enabling us to stop many leaks and to establish satisfactory flat hourly rates. Too many contractors, we believed, were figuring their costs on the basis of yardage dug, hauled, dumped, graded and compacted, even though the variations in materials handled, as well as other considerations, made such figures unreliable for estimating purposes. Then, too, we started operating our own quarry and a couple of sand and gravel pits in addition to renting shovels (with the services of the operators) for federal, state, county, municipal and private use.

When we rented shovels to others, the competence of supervision and the general conduct of the jobs were additional variables over which we had no control. So we decided to place all equipment on a flat hourly-rental basis, renting our own shovels to ourselves as well as to others. This made it necessary to establish rental rates which would (1) return a fair profit as determined by our cost records; (2) be low enough to enable us to meet competition, and (3) be low enough to permit us to rent our own equipment to ourselves for our own work.

Early in the game we determined, after studying cost systems used by others, that records could be and frequently were carried to extremes. There are so many unknown quantities in excavating that accuracy to four decimal points on one minor item might mean nothing compared to some major expense that could not be accurately predicted. Another thing we wanted to do was to arrange our bookkeeping to do double duty so that only a minimum of purely cost records would need to be kept. The only part of the system which goes beyond routine bookkeeping is a combined monthly-yearly recapitulation sheet (Table I) for each piece of equipment.

How data are assembled

At the close of each day the operator of each piece of equipment turns in a brief report on a printed form, stating his working time, the operating time of the machine and other time figures and operating facts. On our own contracts or operations each foreman submits a daily time sheet, stating where and how long each piece of equipment was operated and how much work it did, together with repair and special expenses as transfer charges, etc.

These facts become a part of our daily bookkeeping records. Each shovel has its own set of daily records showing when, where, for whom and how long it worked: how much it earned; who operated it; how many hours he worked; what he was paid; how much gas, oil and grease were used and what they cost; what the repair parts were; how much they cost and from whom they were purchased; what mechanic made the repairs, how long it took and what he was paid for the work on a pro rata basis; the cost of moving the shovel from one job to another, etc.

At the end of each calendar month the earned income is totaled and balanced against the accrued costs, to which are added monthly overhead and insurance charges (pro-rated according to the original cost of the shovel); the pro-rated charge for the pick-up truck which accompanies each shovel, and the net earned monthly profit. Table II shows daily records for a few days in August, 1940, of Shovel 6 with the totals for the month.

An engineering economist or expert accountant would probably ask what we do about depreciation reserves, amortization, outgoing and incoming interest burden, etc. We don't set up any depreciation reserves. We depreciate our equipment at the end of each year, taking into account two things: (1) actual value at quick sale and (2) value to us, based on actual physical condition. These two values are used for the following purposes: The first value (at quick sale) is used for bank and credit statements and is, of course, the lower of the two values. The second value (value to us) is used for our personal information. You can get a good idea of these values by glancing at the accompanying chart, which shows depreciated (quick sale) value and probable resale value (value to us). As a matter of fact, our depreciated value at the end of the year is a single value which is a weighted combination of the first two values mentioned. This final depreciated value is, however, a hypothetical figure and does not appear on any of our records or charts.

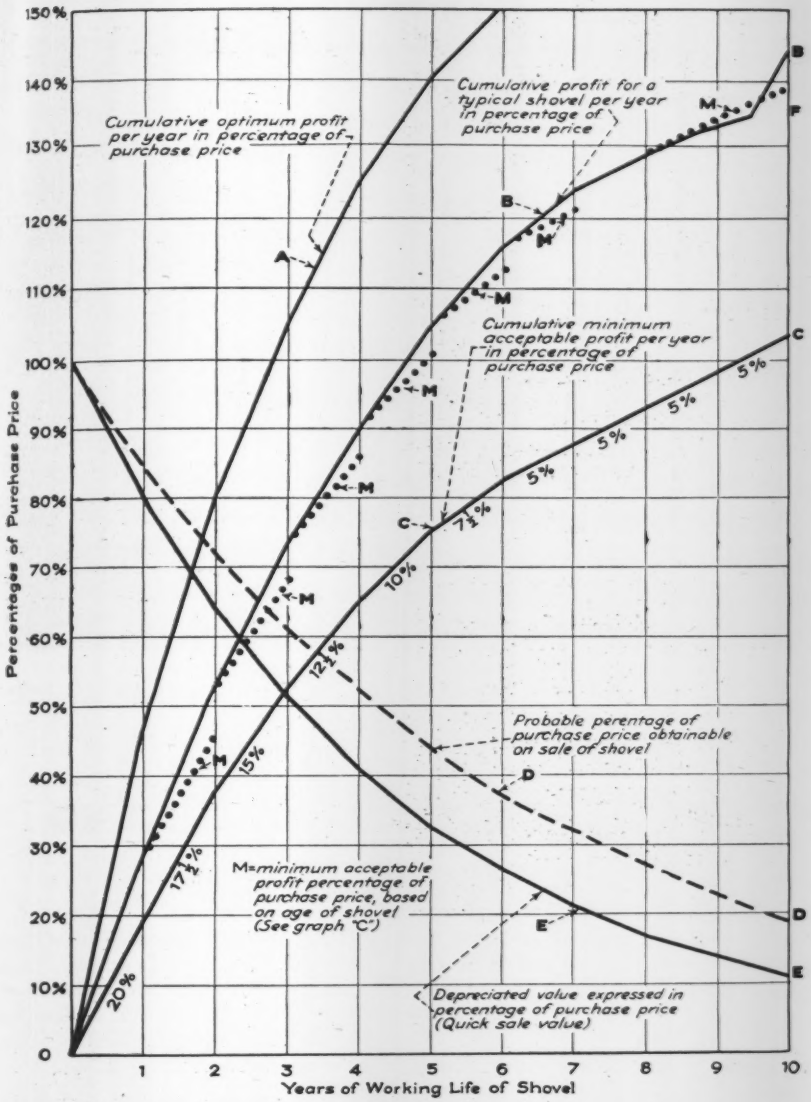
We don't have any definite amortization fund to liquidate indebtedness for purchase price of equipment. Probably, like most contractors, we worry more about how to meet the notes when they fall due than about setting up funds for which we might not be in a position to allocate cash when some theoretical system says we should. You might say we handle amortization this way: If a piece of equipment doesn't pay for itself as rapidly as we think it should, we amortize it by getting rid of it.

In general, we believe a shovel should earn a minimum net of 20 percent of its original purchase price the first year, 17½ percent the second year, 15 percent the third year, 12½ percent the fourth year, 10 percent the fifth year, 7½ percent the sixth year and a minimum of 5 percent each year thereafter. These percentages are the boundaries of the danger zone and any shovel which barely earns them is likely to be sold at any time.

Overhead, as we define it, consists of non-production expenses: office and supervisory salaries, rent, taxes of all kinds (including income tax), and interest on money borrowed for the operation of the business. It does not include interest on money borrowed for the purchase of equipment. Interest on purchase money notes is considered as capital investment, on

Table II—Part of monthly record sheet showing how daily records are entered and the overhead and service charges for the month.

Operating data	Time, hours	Expenses	Receipts
Aug. 27 State:—Sawyer-Hinsdale	3	....	$18.00
Operator:—S. Traver	10	$6.66	
35 gal. gas	..	3.50	
Repair labor:—Buckley	3	3.00	
" 28 State:—Sawyer-Hinsdale	2	....	12.00
Operator:—S. Traver	10	6.66	
34½ gal. gas	..	3.45	
" 29 State:—Sawyer-Hinsdale	8	....	48.00
Operator:—S. Traver	10	6.66	
" 30 State:—Sawyer-Hinsdale	8	....	48.00
Operator:—S. Traver	10	6.66	
35 gal. gas	..	3.50	
" 31 State:—Sawyer-Hinsdale	7	....	42.00
Operator:—S. Traver	10	6.66	
Repair labor:—Buckley	½	0.50	
53# Mach. steel, M. S. Perkins	..	3.12	
Cable clips, Knowlton & Stone	..	1.78	
Monthly insurance charge	..	7.49	
Charge for pick-up truck No. 12	..	21.40	
Monthly charge for overhead	..	11.62	
Profit for month	..	609.63	
		$996.00	$996.00



Cumulative optimum, typical and minimum acceptable profits per shovel per year plotted against quick sales value and estimated service value to owner.

which the equipment must pay a profit.

Each month the daily records are recapitulated on a report sheet for each piece of equipment. These sheets (see Table I) contain a column for each month of the year, as well as columns for yearly totals and averages. Here is our only departure from simple bookkeeping into what might be called "cost accounting", except for the graphs we make for our personal information.

In the column under each month are entered the total and average time, income and cost items for that month, together with total income earned since the purchase of the equipment. At the end of the year, on the same sheets, these totals are recapitulated and stated in yearly totals and averages.

If you compare our daily record sheet with our monthly-yearly recapitulation sheet, you will see that our system is one that any bookkeeper can handle easily in the normal course of his work without a special set of accounts and without special training. These figures, by the way, have been found entirely acceptable by the Bureau of Internal Revenue.

What the records tell us

We can tell to our satisfaction whether it is the operator or our equipment that is making or losing money for us. We can compare the number and kind of breakdowns of one machine with those of another machine of the same make and capacity, due consideration being given to the kind of work each is doing. We also compare the costs for gasoline, oil, grease, etc., as well as the labor costs for repairs.

If an operator is not watchful his costs for gasoline, oil and grease are likely to be higher than those of a more thrifty operator. On the other hand, an operator who is stingy with oil and grease may appear at first to save us money. But changing oil and greasing a shovel less frequently than should be done result almost invariably in high repair costs. If an operator is making minor repairs on the job this fact is reflected in smaller repair charges by repair mechanics and also has the tendency to keep down the number of expensive major repairs. All of this shows up at the end of the month and particularly at the end of the year, when we recapitulate our monthly costs and repair our shovels.

Our cost records on replacement and repair materials and parts tell us more than merely that one item cost less per working hour than another. Take preformed wire rope, for instance: The records show it takes less time to change cables with preformed than with non-preformed, probably because the preformed is easier to handle and requires no seizing.

Another example of the value of our records to us occurred recently when we noticed that two of three shovels of identical make were operating on a gasoline cost of 32c. an hour, while the third shovel was using 43c. worth an hour. After making sure that the gasoline was actually going into the fuel tank of the shovel, we checked the carburetor and found the trouble. A new carburetor brought the gasoline consumption of the third shovel down to the 32c. an hour rate.

The choice of a new shovel, or any other new piece of equipment, is based on the profit-earning records of the other shovels we own of the same make. None of our nine shovels is ever singled out to be penalized in the cost records in case there is insufficient work for it to do. A high monthly overhead against a shovel for which there was insufficient work would be the fault of business conditions or management and would not be blamable on the shovel. To enlist the enthusiasm of our operators in keeping costs down we award monthly prizes to those achieving the lowest operating costs.

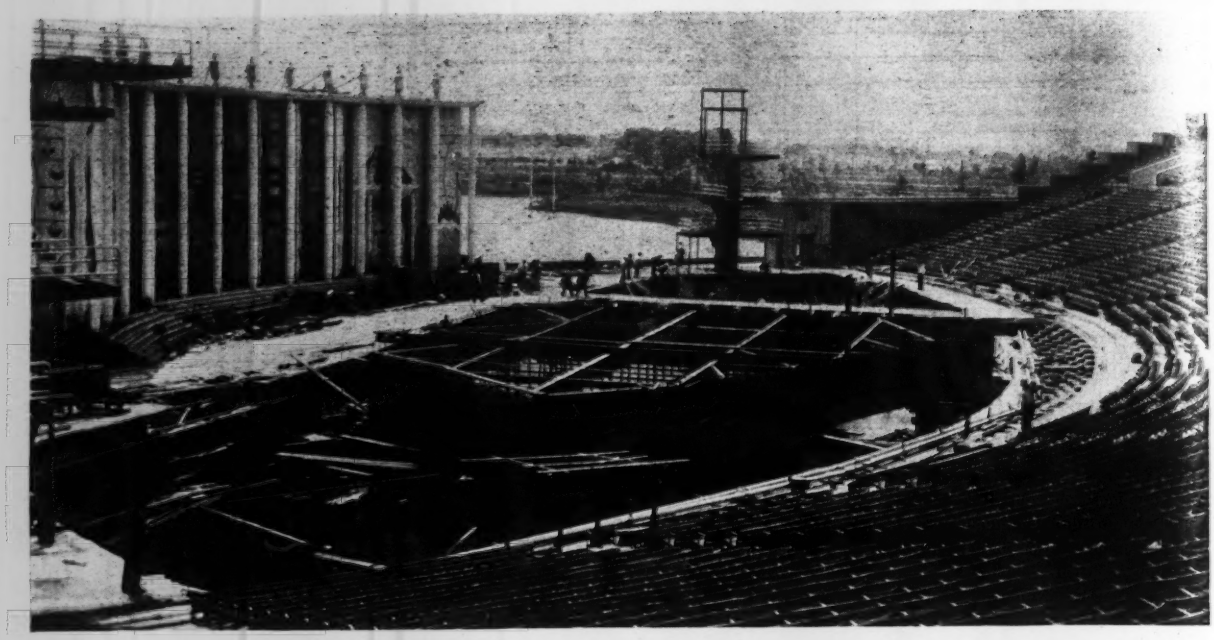


Fig. 1. Deep areas at ends of pool on New York World's Fair site are provided by sinking two all-welded 60x65-ft. tanks. Tank shown will soon occupy area of open water in left foreground.

A Swimming Pool Tank Built in a Lake

***Contents in Brief**—In transforming the famous Aquacade of the New York World's Fair site into a modern swimming pool two 60x65-ft. steel tanks were used in an unusual manner as the outside forms for the reinforced-concrete bottom and side walls for the two diving areas. Another unusual construction feature is the special wooden form for the bottom slab of the pool's shallow portion.*

IN ORDER TO CONSTRUCT a permanent swimming pool in Fountain Lake on the New York World's Fair site where Billy Rose had his Aquacade show for two years, two interesting construction problems are being solved. These are: (1) providing outside forms for the two deep diving areas, and (2) designing forms for the bottom slab of the shallow area. To provide facilities for the Aquacade swimmers a steel tank measuring roughly 50 ft. wide and 200 ft. long with greater depths at the ends was built to rest on about one hundred 14-in.-diameter, 85-ft.-long wooden piles. For the most part the bottom of this tank was above the water level of the surrounding lake, but where deep diving areas were needed the tank bottom was roughly 2 ft. below the lake surface. When the World's Fair closed last year the steel tank was removed for another use, but the foundation piles and reinforced-concrete construction about the tank was left in place.

The permanent pool now under construction (Fig. 1), which is to accommodate 2,800 bathers, will be the same size as the older pool but with the under surface of the bottom slab for the 12-ft.-deep east diving area 7 ft. below the lake level and the under surface of the same slab for the 10½-ft.-deep west end 5½ ft. below. The 1½-ft. bottom slab for the pool's shallow portion between the two diving areas is to be 2 ft. above the lake level. The approximate mud line is about 10 ft. below the same elevation.

Major construction problem of the two previously mentioned was providing outside forms for the reinforced-concrete bottom and side walls for the two diving areas. This is being solved by the use of two steel tanks roughly 60x65 ft. in size, which were built in 5½ weeks by 12 welders and helpers using a dozen gasoline-driven direct-current welding machines.

Building the tanks

First step in making use of the tanks was to drive additional piles in those areas in order to provide one pile for every 63 sq.ft. Then a diver descended and cut off the piles 7 ft. below the surface in the east end and 5½ ft. below lake level in the west end. While this latter work was under way, the two all-welded steel tanks of $\frac{5}{16}$-in. steel plate were built in the dry on falsework over the piles for the pool's shallow portion. The tank for the east end is 7½ ft. deep and that for the west 6 ft. Side walls and bottom of the tanks are stiffened by 20-lb. steel rails set on 3½-ft. centers, and for temporary bracing at the top of each tank four steel I-beams varying in size from 24 to 30 in. were placed the long way, supplemented by wooden cross-bracing. In addition, between the lower flange of the I-beams and each tank's bottom, posts made up of

the 20-lb. rail on 3½-ft. centers were employed.

As each tank was completed it was raised by four 50-ton hydraulic jacks to permit replacement of the falsework by two 12x12-in. wooden skids sloping toward the end of the pool where the tank was to be used. With these skids in place, each tank was moved down its respective skids by means of two 7½-ton hand-operated chain blocks pulling at the tank's front. The skids were placed so that as the tank slid off those members, it was floating over the final position desired. To make sure that the tanks did not slide down the skids too fast, two rope block and tackles pulling at the rear corners were eased off as the chain blocks were tightened.

Concreting the tanks

Once the tanks were afloat and held exactly over the final position desired, placing of concrete for the bottom and side walls began with transit-mix concrete delivered by two-wheel buggies. About an 8-hr. day was required for placing the 400 cu.yd. for the west tank and but little longer for the 460 cu.yd. for the east tank. As this material was placed it caused the tanks to settle and gently come to rest on the wooden foundation piles with each tank's top about 6 in. above the water line.

Because of the gradual slope of the inner faces of the side walls, no inside forms were needed in constructing the side walls as high as the tanks. Above that level the side walls could be built in the dry by ordinary methods. Since pockets had been left around the steel I-beams used for temporary bracing, those beams could be burned off when the concrete for the lower side walls had set. Likewise, the posts under the I-beams were burned off when the bottom slabs lacked about 2 in. of their final thickness.

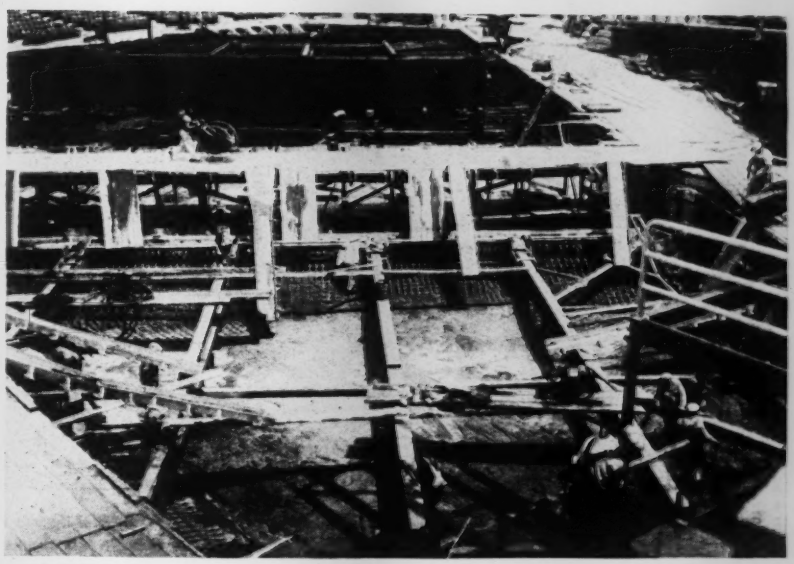


Fig. 3. West tank is in position in immediate foreground. By use of transit-mix concrete delivered in buggies, reinforced-concrete bottom and sidewalls are being constructed, which will cause tank to sink roughly 5 ft. and come to rest on about 130 wooden piles.

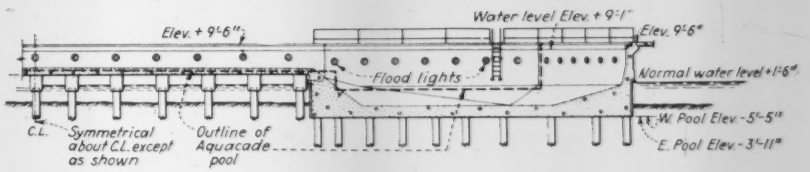


Fig. 2. Diving area at west end of pool is 10½ ft. deep, while that at east end is 12 ft. Depth in pool's shallow area is 4 ft.

Forms for shallow area

Another interesting problem arose in designing forms for the 110x70-ft. shallow area, since the forms were to be supported on the wooden piles of that area rather than on the mud a few feet below the surface. As a result, the piles of the shallow area were all cut off ½ ft. below the water line and then for each pile a 2½x2½-ft. box was built with an open top, side walls 3 ft. high, an 18-in. square opening

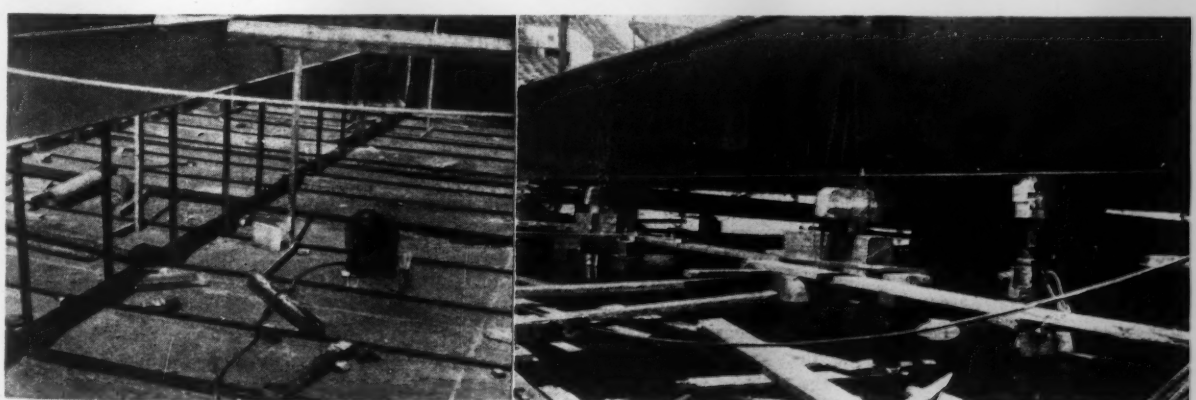


Fig. 4. Bottom and side walls of tanks are stiffened by 20-lb. steel rails on 3½-ft. centers, as shown by left photo. Right photo reveals how each tank as it was completed was raised by four 50-ton jacks to permit falsework to be replaced by two 12x12-in. wooden skids.

Fig. 5. To support formwork for shallow area on foundation piles rather than on mud some distance below, a box form of type at left was used at each pile. Right view reveals how 2x8-in. wooden stringers could be supported on wales of box form. Concrete is poured flush with top of boxes and allowed to set before 1½-ft. bottom slab is constructed.

in the bottom, and a 6-in. channel extending through the form about ½ ft. from the bottom. Next move was to place one of these forms over each pile, spike the channel to the pile, and close off with fiber board the remaining opening around the pile in the form's bottom.

Since at this stage the tops of the 1,700 square forms required were all at the same height, sheathing for supporting the bottom slab could be carried on the box forms and their wales. Concrete was first placed in the individual forms around the piles to a point flush with the bottom slab's under surface and allowed to set before concrete for this 1½-ft. slab was placed.

Administration

The $300,000 contract is being done for the park department of the city of New York with Robert Moses, commissioner, and Gus Chirlian, resident engineer. The general contractor is the Wheeler Engineering Co., with Arthur Hamburger, president, resident engineer on the job. Craftsmen Welders, Inc., Brooklyn, N. Y., George Lavine, president and resident engineer, constructed the tanks, and the Kaufman Concrete Corp., New York City, with Louis M. Kaufman, project engineer, did the concrete work under a subcontract. Aymar Embury, II, New York, was architect for the work and Waddell & Hardesty, New York, were the consulting engineers.

Slum Clearance Expedited by New State Laws

In May the legislature of the state of New York passed the Desmond-Mitchell act on neighborhood redevelopment, which makes possible a new combination of private and municipal effort toward slum clearance and low cost housing in municipalities. The act, first of its kind in the country, permits all municipalities in the state of New York to offer private corporations special inducements to build large-scale, low-rent housing, though at the same time restricting their activities by various controls to protect public interest.

The special privileges granted the redevelopment corporations include ten years' immunity from the payment of any real property taxes in excess of those assessed against the property at the time the redevelopment is inaugurated. The corporation has the power of eminent domain or condemnation of property as soon as 51 percent of the necessary property has been acquired. The corporation also has the right to obtain public lands by either sale or lease on consent of the governing body concerned. Likewise it may seek the investment of funds from practically all types of public and private organizations or individuals.

One of the major restrictions on the redevelopment corporations is that the local planning body must approve the housing project, which must conform to the city's master plan.

With passage of a neighborhood redevelopment corporation act just before its legislature adjourned, Illinois became the second state in the country to invite the rebuilding of slum areas by private effort on a large scale, reports the National Association of Housing Officials.

Under the Illinois act a redevelopment corporation, whose project has been approved by a municipal redevelopment commission and the local planning agency, can start condemnation proceedings against minority property owners when 61 percent of its building site by area has been obtained.

Chief difference between the Illinois and New York laws is the latter's grant of 10 years' exemption from real property tax payments in excess of taxes assessed against the property used when redevelopment activities were undertaken. In Illinois the redevelopment projects will have no tax subsidy of any kind. Another major difference is that Illinois' law provides for the termination of control by the redevelopment commission as soon as the corporation has completed the redevelopment plans, while the New York law gives the supervisory agency control as long as tax privileges exist.

Improving Sand-Clay Mixes for Roads

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***Contents in Brief**—Both clays and sands that are not suitable for highway work in their natural state can be made stable by proper mixing. This article reports field experiments in mixing clay slurry with sand to produce mixtures comparable to those shown to be desirable by laboratory experiments.*

CLAY with a high plasticity index, or a cohesionless sand with a negligible plasticity index, will give trouble in subgrades and bases for highways. Tests of laboratory mixes of sand and clay as well as of natural mixes have shown that a proper mixture of the two will produce satisfactory results, but numerous failures in large-scale attempts to combine these materials properly attest to the need for the development of more effective methods of mixing them on the highway.

The basic difficulty in securing satisfactory results lies in the pulverization of the clay to such a fineness as to secure a truly intimate mixture with the sand. In the laboratory, sand and finely divided clay may be combined in various percentages with the proper amount of water and the plasticity index determined. Such mixtures of sand and clay combined with varying amounts of water and compacted by a uniform method may be tested for their resistance to penetration or shear, for their resistance to absorption, and for their density. These are standard tests, which need not be described here. Laboratory tests require a thorough mixing of the sand and clay with water, and comparative results cannot be secured on the road unless the clay has the same fineness as in the laboratory tests. This and proper mixing are difficult to secure with the ordinary construction methods.

An investigation was made recently in the laboratory of District No. 14, Texas highway department, in an attempt to determine the best procedure for adding small quantities of clay to large quantities of sand by comparing samples of: (1) a mixture of sand with a clay that had been dried and pulverized to pass the 40-mesh sieve, and (2) a mixture of sand with a clay that had been intimately mixed with sufficient water to give a moisture content well above the liquid limit. These tests indicated that the mixture made with clay that had been reduced to a uniform slurry was denser and more stable than a similar mixture made with the dried clay. The difference is ascribed to the finer pulverization of the clay in the slurry and its probable tendency to coat the sand particles more uniformly. Also this investigation showed that the cost of producing fine ground clay in a dry form was considerably higher than in the wet or slurry form, both in initial plant and construction-operation costs. This conclusion is based on the performance of a small model slurry mill designed by the personnel of District No. 14 and on quotations by manufacturers of various drying and grinding plants.

In order to test the use of slurry in mixing clay with sand, a full size slurry mixer was constructed during October, 1940, and was used on a half-mile section of a state experimental project near Bastrop in Bastrop County. The mixer was constructed from an old pug mixer having a 30-in. drum 56 in. long. Fig. 1 shows the details of the mixer. Its hopper has been divided into two compartments. The clay and water enter the right compartment and fall downward into the drum, where they are mixed into a slurry. The slurry, impelled by centrifugal force and hydrostatic head, passes upward through a screen into the left compartment. From this compartment it flows by gravity through an opening in the wall of the compartment, and thence in a trough to the trucks or slurry storage tank. The movement of the slurry through the mixer is indicated by the arrows.

The clay selected for use had a plasticity index of 36 and the sand a plasticity index of 2. A sieve analysis showed that about 98 percent of the materials passed the 40-mesh sieve. These materials were mixed in different percentages with various amounts of water and their Proctor density or weight per cubic foot determined. These tests showed the greatest dry density would be secured with 15 percent clay and 85 percent sand, the proportions being based on dry

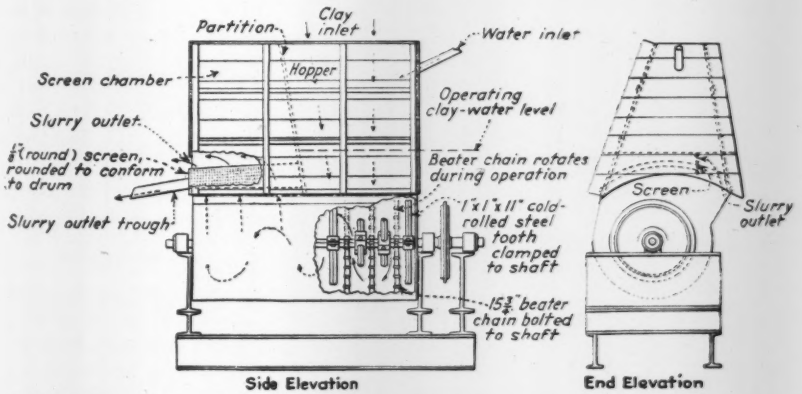


Fig. 1. Mill used to produce clay slurry in the field. The clay-water level in the hopper is kept above the screen level to promote upward flow of the slurry through the screen. Arrows indicate the path of the slurry through the mill.

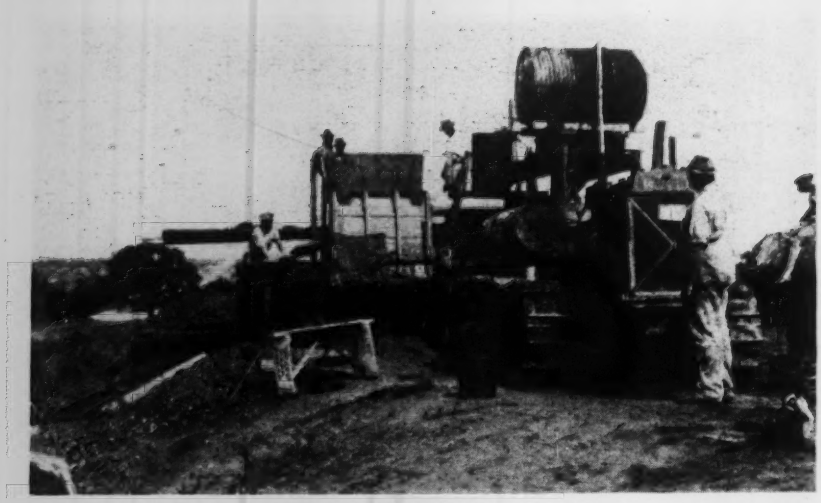


Fig. 2. Field set-up for making slurry. This home-made plant, using a 60-hp. tractor for power, can convert dry clay into slurry at the rate of 200 lb. per horsepower per hour.

weights. These proportions then were adopted for use on the road and calculations made to determine for each station of 100 ft. the dry weight of the mix necessary to produce the section area shown on the plans. The unit weight of excavated sand with its contained moisture then was determined, the sand dried, and the moisture content and dry weight calculated. From these data the weight of dry sand (85 percent of the dry mixture) was calculated for each truckload of two cubic yards and the number of cubic yards or truckloads necessary for each 100 ft. determined. The sand then was hauled and dumped at proper intervals and spread to provide a loose, uniform layer along and across the roadway.

Making clay slurry

Clay was excavated from the pit, hauled and stockpiled at the top edge of a slope adjacent to the roadway in order to provide a gravity flow of the slurry into the trucks. The slurry mixer, powered with a 60-hp. tractor, was set up at one end of the clay stockpile. Water was hauled from Bastrop in two water tank trucks, totaling 1,500 gal., and pumped into a storage tank mounted adjacent to and above the slurry mixer.

The clay was loaded from the stockpile into wheelbarrows by hand and run over a platform scale to the mixer. The barrow load was set for 200 lb., net (wet weight). A barrow load was dumped into the mixer every 40 to 60 sec., and water ran continuously into the mixer, the rate being changed as necessary to maintain the desired consistency of the slurry. The production rate was slightly over 6 tons (dry weight) of clay per hour. Production of slurry perhaps could have been materially increased had the clay been wetted and partially slaked at the source or in a slush pit.

Fig. 2 is a general view of the slurry plant showing the 60-hp. tractor, the mixer, the 500-gal. storage tank for water and the trough for carrying slurry from the mixer to the trucks.

This arrangement produced slurry at the rate of 200 lb. (dry weight) of clay per horsepower per hour. The small-scale mixer used in the preliminary investigation was built with fixed teeth alternating with revolving teeth, and, with a different type of clay, produced at the rate of 240 lb. of dry clay per horsepower per hour. When this design was tried in the full-size mixer, the revolving teeth stripped due to the presence of rocks and large, hard clods in the mix.

Rate of production

The product of the full-size slurry mixer contained no visible lumps of clay, though the screen would permit passage of lumps up to $\frac{1}{8}$ in. in diameter. In operation the screen remained clean and unstopped because of the vigorous agitation of the mix in contact with the screen on the under side. The slurry was made at a moisture content normally varying from 110 to 150 percent (based on the dry weight of the clay). The lower percentage of moisture produced a slurry so thick that when dumped from the trucks, it would not flow out at a uniform rate, resulting in an uneven distribution on the road.

The slurry flowed from the mill to the trucks down a sloping trough. To prevent the stopping of the mixer when the trucks were not loading, a temporary storage for the slurry was provided by installing a 250-gal. tank and two 55-gal. drums, each with a flap valve discharging into the trough.

Application of the slurry

Two 1,000-gal. water trucks, with spray bars detached and replaced with a "splash board," were used to haul and distribute the slurry on the road. Fig. 3 shows the slurry being applied on the sand. The round splash board, 22 in. in diameter, swings just below the 4-in. outlet from the tank.

The dry weight of clay required for 100 ft. of roadway was calculated as 15 percent of the dry weight of the mixture. During the day a tally was kept of the number of 200-lb. barrow loads (wet weight) of clay dumped into the mixer. Throughout the day the slurry produced was placed on a previously determined area of the sand, and at 20-min. intervals samples were taken of the clay being dumped into the mixer and these were carried to the field laboratory at the end of the day, where they were weighed and then dried over night in an oven at a temperature of 100 deg. C. The following morning these samples were removed from the oven, weighed, and the average moisture loss determined. From this average moisture loss and the wheelbarrow tally, the amount of dry clay placed on the given area the previous day was calculated.

Usually one truckload of slurry contained between 1.1 and 1.3 tons of clay (dry weight) and was equivalent to about 15 barrow loads of clay. If, at the beginning of a day's run, it was found that a particular area of sand required less than a full day's production of slurry, the number of truckloads of slurry was calculated for the area by using 1.2 tons per load as the conversion factor.

Mixing sand and slurry

The method of mixing the slurry with the sand was as follows: An offset disk harrow, drawn by a tractor, worked the mix constantly until it appeared to be entirely uniform and free from clay concentrations. After the material had been thor-

Fig. 3. Spreading slurry with a tank truck. The spray bar has been removed and a circular "splash board" has been placed just below the 4-in. outlet pipe.

oughly mixed and had dried down to optimum moisture, it was compacted to as close to Proctor density as possible.

Effect of oil studied

A 900-ft. length of the project was treated with clay slurry containing a small quantity of road oil (RO-3) emulsified in the slurry at the mixer. The amount of road oil added to the slurry was equal to 0.8 percent of the weight of the dry sand-clay mix. Preliminary laboratory tests indicated that this was the minimum amount of RO-3 necessary to provide fair waterproofing. This section was so treated in order to test a lean mix of this type under road conditions.

In order to determine whether oil asphalt could be emulsified in the slurry, a small quantity of OA-230 asphalt was added at the mixer. This combination contained about 25 percent asphalt and 75 percent clay by weight, and when examined under a miscroscope seemed to be thoroughly emulsified and to compare favorably with commercial products of a similar nature.

Condition of the highway

The project was completed (except for topping) in the winter of 1940-41. Unusually heavy and prolonged rains have prevented topping to date. Regarding field behavior of the open sand-clay base, it may be said that, once initial drying and compaction were complete, traffic produced only slight rutting in the top inch of the base in spite of heavy rains. The asphalt treated sand-clay rutted somewhat less than the untreated material. When dry, both materials appeared extremely hard and stable. As might be expected, the absence of aggregate resulted in a slick surface when wet.

The top proposed for this base is a penetration type known in Texas as a "triple asphalt surface treatment," with maximum size aggregate of 1 in. in the bottom course, $\frac{3}{4}$ in. in the middle course, and $\frac{3}{8}$ in. for the top course. The average thickness of this pavement will be approximately 1 in.

Several uses of this method of mixing small amounts of clay with sand have been suggested. Sandy river gravel or other aggregates which will not set up due to the lack of cohesion in the soil binder may be made to set up by the addition at the crushing or screening plant of small quantities of slurry; or, if the gravel is deficient in binder, both sand and slurry may be added. In localities where both sand and clay are available but natural sand-clay gravel or finer grained sand-clay mixtures cannot be found for use as a base material, a satisfactory sand-clay mixture may be prepared in the manner described. When embankments are being constructed of cohesionless sands, a slurry may be used in the compacting operations instead of water to bring the material to optimum moisture content. From 3 to 5 percent of clay has been found to be effective in setting up such sands.

Policy on Cross-Connections Recommended to A.W.W.A.

THE American Water Works Association committee on cross-connections with E. Sherman Chase, Metcalf & Eddy, Boston, chairman, recommended at the association's recent annual convention at Toronto, Ont., that the A.W.W.A. adopt the following expression of policy with respect to cross-connections:

(1) No new cross-connections should be permitted between potable supplies and non-potable or unapproved supplies. Existing cross-connections should be eliminated in the shortest practicable time but where immediate elimination is impracticable, such connections should be made only through approved, all-bronze, double-check valves, properly installed, regularly tested, periodically and thoroughly inspected, and cleaned and repaired when necessary.

(2) In the case of industrial or other establishments having separate supplies of potable and non-potable water distributed through independent systems of piping without known cross-connections, consideration might well be given to providing double checks as described above on the service pipes leading from the public mains. This would mean the development of more improved designs for check valves in smaller sizes than those now available. In any event, fixtures of the two distribution systems should be painted distinguishing colors to reduce the chance of cross-connections through ignorance.

(3) High-pressure public fire systems when supplied from non-potable sources should have no direct connection with the domestic supply mains. However, during the present period of national emergency the continued use of existing systems now cross-connected may be tolerated if the protection afforded by the approved type of double-check valve installation is provided under authorization by the appropriate water and state health officials.

(4) Fire protection programs should not include pumping from polluted sources into public mains through hydrant connections.

Forming Details and Practices For Architectural Concrete

BUILDING DESIGNERS' LIBRARY

A. J. Boase
Manager, Structural and Technical Bureau
Portland Cement Association, Chicago

***Contents in Brief**—Successful use of architectural concrete depends upon form details. Better workmanship and somewhat better materials are required. Tightness, rigidity and ease of removal are necessary form characteristics. Form ties at window and door openings should be carefully placed to pull the sheathing tight. Allowance should be made for form swelling. Handling of construction joints and rustication inserts involves special techniques. Height of lifts should be less than for ordinary work. Curved wall forms require minimum stud spacing or horizontal ribs.*

DESIGNERS AND BUILDERS of forms for architectural concrete are required to give attention to a number of details that are not particularly important in ordinary structural concrete work. The condition of the forms *at the time the cement sets* largely determines the appearance of the completed job. If the forms bulge, the finished wall will be bulged and irregular. Where the forms leak, a rough edge or sandy surface will result. If a plaster mold is forced out of place, an irregularity that is almost impossible to correct will remain in the concrete.

The fact that, in addition to being the structural medium, the concrete is also to be the finish of the structure is not always appreciated by the builder. Forms for architectural concrete require better workmanship and somewhat better materials than the ordinary structural job.

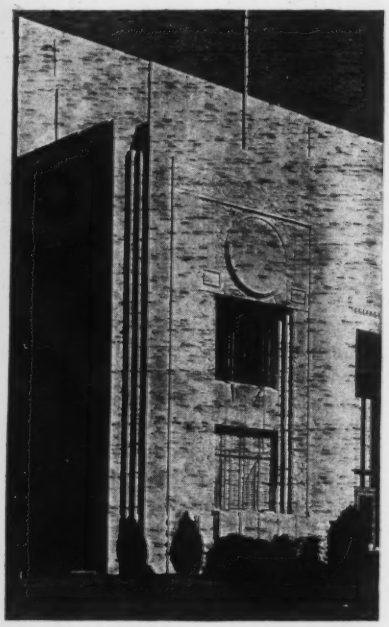


Fig. 1. An example of what can be done in architectural concrete.

Leakage must be avoided

Leakage of water through forms causes loss of cement which exposes the aggregate at the point of loss, producing sandy areas and rough edges. These defects are difficult to correct by patching and every precaution should therefore be taken to produce watertight forms. Tongued and grooved lumber and shiplap for sheathing will produce tighter forms than square-edged lumber. Where plywood is used for sheathing, the vertical joints between sheets should be backed with studs (See Fig. 2) and the horizontal joints with pieces of 2x4's between the studs. The joint itself should be filled with a mixture of about equal parts tallow and portland cement or other suitable filler. A 4x4 stud instead of a 2x4 at the vertical joint will allow placing the nails farther from the edge of the plywood and thereby permit more re-uses without trimming the edges. It is not necessary to nail the plywood to the horizontal filler pieces between studs.

Tight corner joints are essential. The ties should be kept as close as possible to the exterior corner but even so the wales may project 18 in. or more beyond the last tie. Deflection in the wales unless properly secured will allow the corner joint to open with subsequent leakage. Wales of 2x6's are, therefore, preferred to 2x4's because of their greater stiffness. Vertical kick strips should be provided against which the wales can be wedged, and the sheathing in one direction should run through the corner, as shown in Fig. 3. These precautions will give a tight corner.

Another advantage of 2x6 wales is that ties can be placed farther apart, usually at 32-in. or 34-in. intervals instead of 27-in. Such spacing allows the use of fewer ties, produces fewer tie-holes to be patched, requires fewer holes in the sheathing and permits better spacing in relation to the studs. The spacing of tie-holes in the standard plywood panel shown in Fig. 2 is such that the panel can be reversed in position.

At window and door openings, ties should be placed inside the opening (See Fig. 4). This location for the ties will make it possible to draw the sheathing tight against the bucks and eliminate some of the holes through the concrete. The importance of this suggestion increases with the size of opening.

Spacing of studs and wales

Proper spacing of the studs and wales will provide true surfaces on the large, smooth wall areas being designed today. In no case should studs be on more than 16-in. centers for 1-in. sheathing or $\frac{11}{16}$-in. plywood, and not more than 12-in. centers for

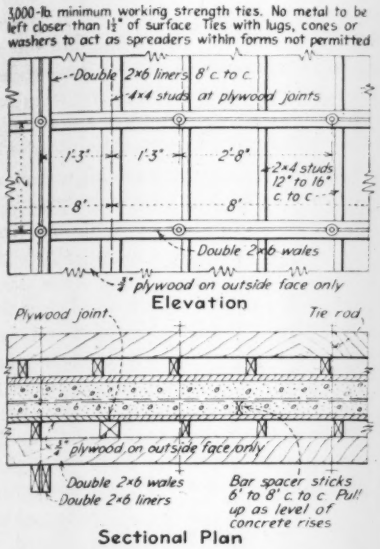

3,000-lb. minimum working strength ties. No metal to be left closer than 1½" of surface. Ties with lugs, cones or washers to act as spreaders within forms not permitted
Double 2×6 liners 8' c. to c.
4×4 studs at plywood joints
1'-3"
1'-3"
2'-8"
2×4 studs 12" to 16" c. to c.
8'
8'
Double 2×6 wales
¾" plywood on outside face only
Elevation
Plywood joint
Tie rod
¾" plywood on outside face only
Double 2×6 wales
Double 2×6 liners
Bar spacer sticks 6' to 8' c. to c. Pull up as level of concrete rises
Sectional Plan

Fig. 2. Typical form framing showing allowable spacing of studs, wales, ties and liners.

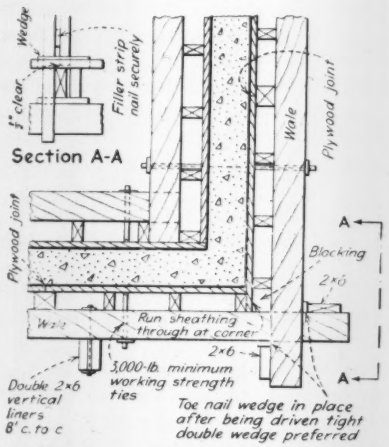


Fig. 3. Corner framing detail showing method of locking corner to prevent leakage.

¾-in. plywood. When the grain of plywood is parallel to the studs the stud spacing should be decreased 2 in.

Wales should be on not more than 24-in. centers. As an added precaution to assure true, vertical walls, vertical wales or liners placed outside the horizontal wales and at about 8-ft. intervals are recommended (See Fig. 2).

If double wales are to be assembled in advance they should be made up with one piece projecting about 2 ft. beyond the other. Greater rigidity will then be obtained and no scab across the joint will be necessary.

Allow for swelling at openings

The 2-in. stock used in window and door bucks will swell and become wedged in the opening, making it difficult to remove them unless some special provision is made. Provision for the swelling can be made by cutting the bucks ¾ in. short, then tacking a ¾x2 in. strip across the end (Fig. 5). In long openings both ends of the bucks should be treated in this manner. After the jambs are removed it will then be easy to remove the head and sill pieces.

Incidentally, a few holes (½-in. to ¾-in.) through the sill form will permit air to escape and excess water to be squeezed out, giving a better sill surface. The same can be done on water tables and other projections.

Height of lifts

Some architectural concrete jobs have been built with continuous placing of concrete for heights of 12 or 14 ft. and even more between construction joints. Such heights complicate the placing problem, and more reasonable heights are advisable. Engineers and architects are familiar with the requirement for placing concrete in columns to the underside of floor or beam and allowing some time for settlement before resuming placing of concrete in the floor slab or beams. Window and door openings present a similar situation. Just how much time should be allowed for settlement is a moot question. Actually, it depends on many factors. The safest procedure is to provide a construction joint at the tops of such openings so that the concrete can be placed to this level and left to harden before proceeding with the next lift. When a rustication strip is provided at this location to hide the joint, many architects place a smiliar strip near the bottom of window openings for balance. This gives the opportunity to use another construction joint, making even lower lifts possible.

Handling construction joints

Construction joints on a level with the floor are not desirable if they can be avoided. It is preferable to put the joint enough above floor level so that form ties can be used above the floor slab. Ordinarily the spandrel can be placed in one operation, avoiding construction joints from window heads to the sills of windows of the next story.

There is little excuse for unsightly

Fig. 5. Elevation showing blocking and bracing of window form to prevent distortion and to hold form securely in place. Note corner detail to facilitate stripping.

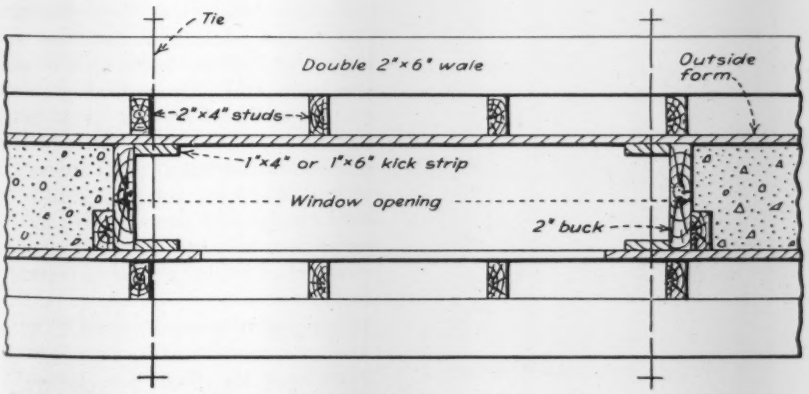
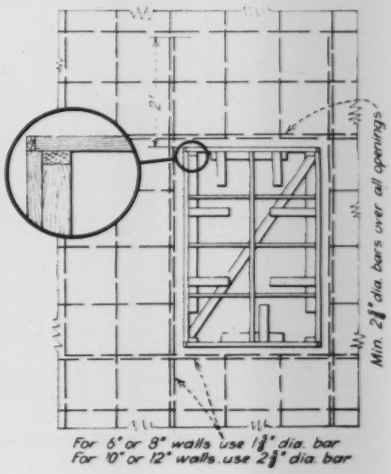


Fig. 4. Plan section through form for window opening. Ties placed inside opening draw sheathing tightly against the bucks.



construction joints, yet they continue to be made. A number of structures beyond criticism in all other respects are marred by such joints. Here again it is difficult to correct the trouble once the joint has been made. The proper procedure is easy enough. It is illustrated in Fig. 6. First, the joint must be a straight, level line. The sheathing may stop at this line, in which case the forms are overfilled and after the concrete has settled it is struck off on a level with the sheathing. When the sheathing extends beyond the joint, which is more common, a 1x2-in. strip set to a level line may be tacked to the inside surface of the sheathing. Concrete is placed to a line $\frac{1}{2}$ in. above the bottom of the strip. When the concrete has settled and is quite firm the strip can be removed and the concrete under the strip troweled lightly to give a straight, level line. Second, a row of ties or jack bolts should be provided 4 in. below the joint and another row of ties not more than 12 in. above the joint. When the forms have been erected for the next lift the lower ties or bolts should be retightened just before resumption of concrete placing. This job should be assigned to a dependable workman. If the forms are not tight, not only will there be leakage to stain the concrete below but the upper lift will project beyond the lower lift, casting a shadow which will emphasize the joint. Third, a thin layer of grout or a few inches of concrete in which coarse aggregate is reduced to about one-half the usual amount should be placed on the hardened concrete. The hardened concrete should be thoroughly wetted before placing the new concrete, and the new concrete should be puddled well to avoid stone pockets at the joint.

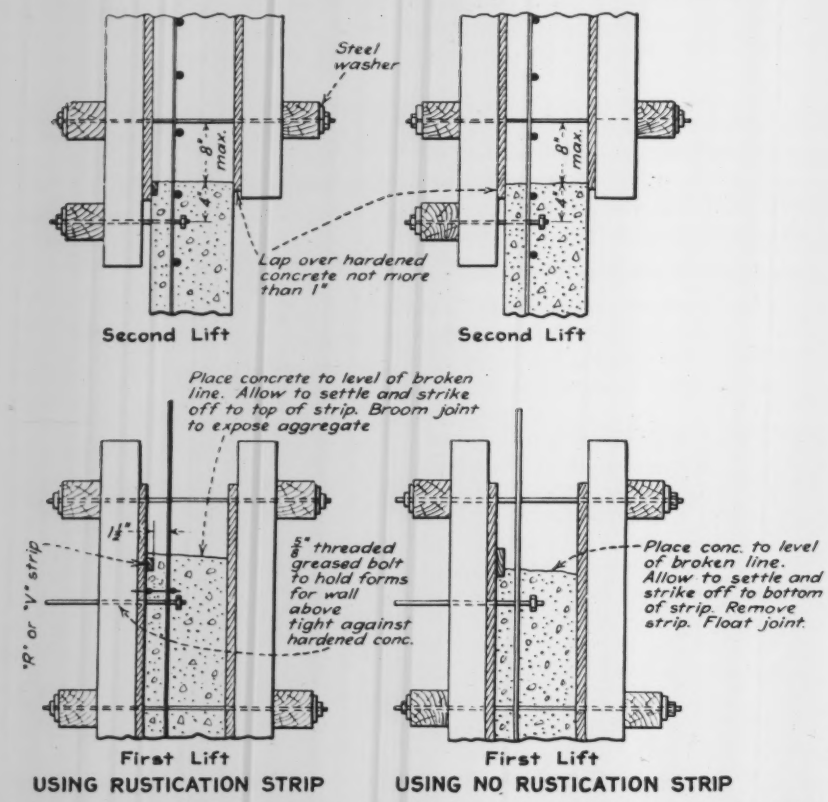

Steel washer
8" max.
Lap over hardened concrete not more than 1"
Second Lift
Second Lift
Place concrete to level of broken line. Allow to settle and strike off to top of strip. Broom joint to expose aggregate
1½"
"R" or "V" strip
⅝" threaded greased bolt to hold forms for wall above tight against hardened conc.
Place conc. to level of broken line. Allow to settle and strike off to bottom of strip. Remove strip. Float joint.
First Lift
First Lift
USING RUSTICATION STRIP
USING NO RUSTICATION STRIP

Fig. 6. Horizontal construction joint details showing method of producing straight level joints without offsets.

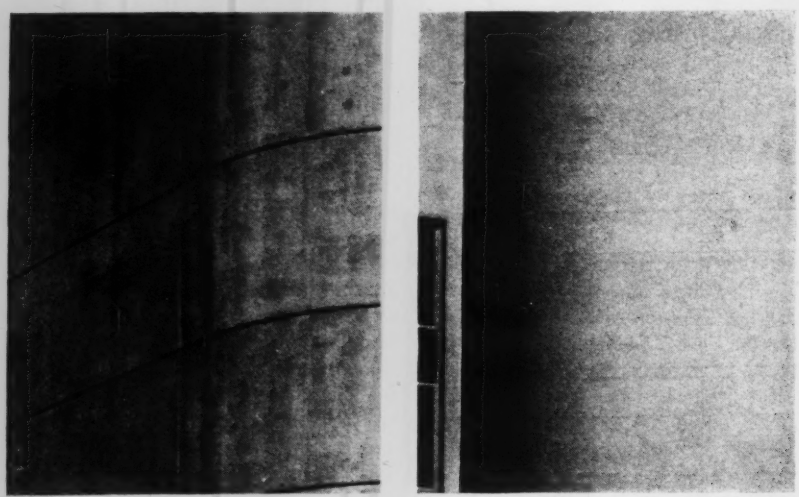


Fig. 7. Cupping or bulging of sheathing between studs can be avoided as shown in these comparison illustrations.

Curved walls

Either too thin sheathing, or studs too far apart, or a combination of the two is responsible for the bulging of the sheathing between studs on curved surfaces, as illustrated in Fig. 7. For corners of this radius, $\frac{1}{4}$-in. or $\frac{3}{8}$-in. plywood is usually used. Often the grain is run vertically as it is then easier to bend, but it should be remembered that there will be more deflection under load when the grain of the outer plies is parallel to the studs than when it is perpendicular. Closer stud spacing is therefore required, or a better practice is to use horizontal ribs. On curved corners less than 4-ft. radius it is usually necessary to use $\frac{3}{16}$-in. Presdwood over a solid backing. For corners of greater than 4-ft. radius the thin plywood can be used but when the grain is run vertically, the plywood should be attached to horizontal segmental ribs spaced about 12 in. apart. At the vertical joints between sheets of plywood, short pieces of 2x4 can be cut in between the ribs. The plywood should be nailed at 6-in. intervals along the ribs.

From Field and Office

Working problems and time-saving methods for engineers and contractors

Vacuum Cleaner Defogs Motor

Commutation difficulties with storage-battery locomotive motors, due to water in the Carlton Tunnel, Cripple Creek, Colo., were successfully overcome by shifting the driving mechanism on the shafts and installing vacuum cleaners to keep the motors dry. Briefly, the contractor made a steel frame of 10-in. I-beams and set it with the battery on top of the locomotive. In addition, he raised the motors by rotating the motor and gear assembly around the shaft of the locomotive and changing the links that hold the outer ends of the motors to extend upward, rather than downward. This gave the motors a 10-in. clearance above the rails, instead of former 3-in. clearance. Even with these changes, there was trouble from water in the motors. S. J. Kester of the Denver office of the General Electric Co., suggested the use of a small air compressor, piped to each of the motor casings to give a positive pressure on the inside of the motor. Since no compressors were available, a vacuum cleaner was connected by a 1-in. air hose to one end of each of the two motors. The locomotive then worked in the tunnel with perfect results.—GUY BARTLETT, *General Electric Co., Schenectady, N. Y.*

Signal Device Protects Trains When Rocks Fall from Cliffs

Paralleling parts of the Columbia River highway in Oregon are installations of wires and fencing whose function is to operate the block signal system and also the train control system on the adjoining Union Pacific R. R. when sizable rock fragments fall from the cliffs. The need for this sort of automatic protection was demonstrated last winter when a basalt pinnacle containing some 6,000 cu.yd. fell from Oneonta Cliff and created a serious menace to fast trains.

As a safeguard, installations of wires (see Fig. 1), have been put in, supported on posts or on poles (and, in extreme cases, carried directly over the track) where the railroad passes along the bases of the high cliffs. Along the Oneonta Cliffs the poles are about 30 ft. high with wires spaced 12 in. apart; elsewhere, as shown by Fig. 2, in lieu of the single wires, ordinary field fencing is used on fence posts. In all cases the wires are so connected that any break in the circuit gives a restrictive indication not only by the block signals but also by signals in the locomotive cab at a considerable distance from the point where the wire is broken. The indications are the same as if there were another train in the block.

The low fence is built in panels connected with plugged-in wires. A rock fragment striking the wire panel pulls the plugs at its ends and thereby breaks the circuit. As soon as the rock is removed or damage to the track repaired, the wires are simply plugged in again.

Demonstrating to Customers Importance of Faucet Leaks

To demonstrate to his customers how a tiny faucet leak represents a decidedly expensive waste, Will A. Hutchins, superintendent of Freeport, Ill., water department, has set up in the lobby of his office a simple demonstration centered around a kitchen sink and faucet. Immediately back of the faucet is a union in which little orifice plates down to $\frac{1}{64}$ in. can be inserted. The orifices are drilled to give approximate rates of flow of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 2 gpm. When Mr. Hutchins opens the faucet wide, the customer is forcefully impressed by the amount of water passing through even the smallest orifice.

The customer is further impressed by a flow indicator mounted to the left of the faucet, which discharges into a one-quart glass jar placed on

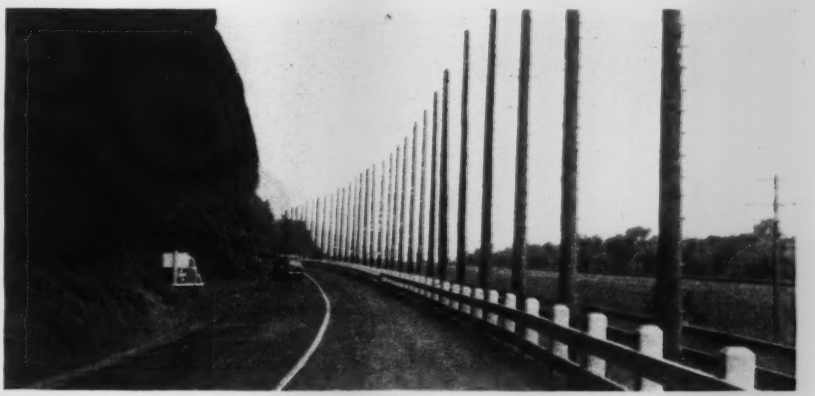


Fig. 1. These 30-ft. poles, carrying wires 12 in. apart, are set where falling rock fragments will be sure to snap the wires.

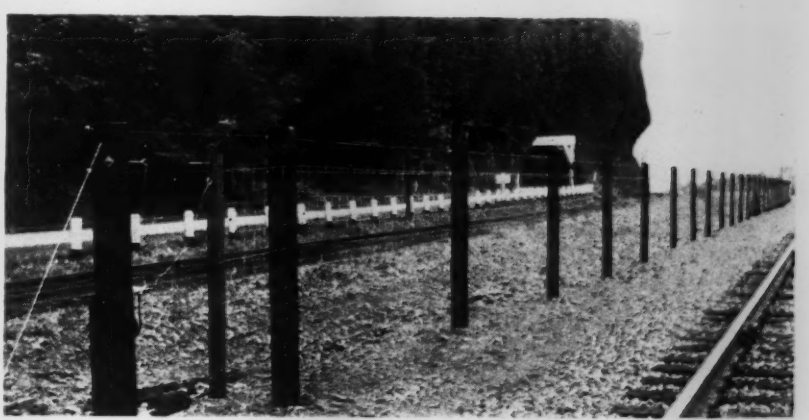


Fig. 2. Where lesser heights are required the installation resembles an ordinary field fence.

the sink. An electric clock with full sweep second hand permits the customer to time the rate of flow for various conditions. In addition a ¾-in. water meter with full sweep hand register installed in the line supplying the faucet measures and totalizes the flow, which further illustrates to the customer the size of various losses.

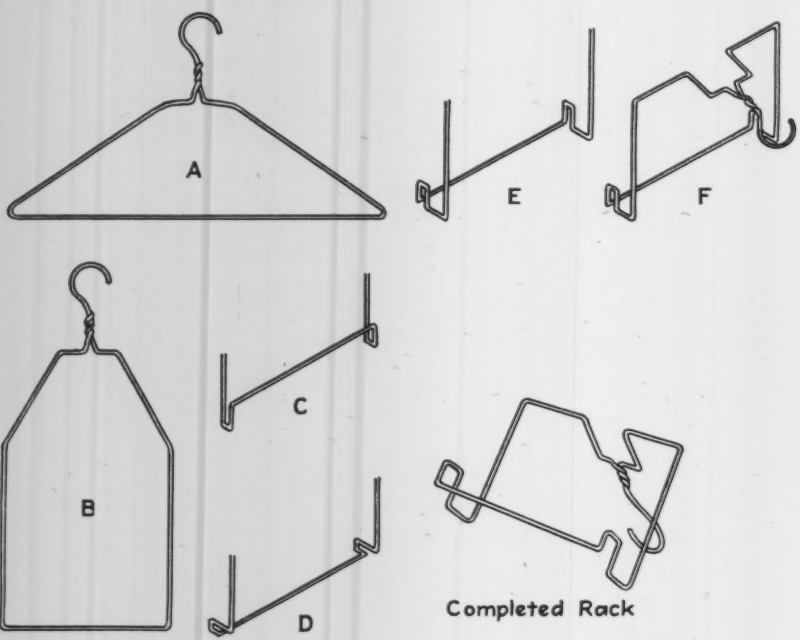
A showcard above the exhibit, graphically emphasizing the impressive monthly cost of even the smallest leak, completes Mr. Hutchins' exhibit, which he considers very valuable in better customer relations.

Long-Distance Welding

When the structural steelwork for the new addition to the Milwaukee post office was completed, the builders lowered their 200-amp. portable welder to street level and welded sheet metal panels for the flooring and roofing by use of a 180-ft. cable leading from the welder to the operator seven stories above. The panels for the floor and roof are of varying size, the largest measuring 48 in. by 15 ft. As they were laid, they were tack-welded from below and above. In fastening them to the I-beam girders, the welds were deposited at 8-in. intervals. The panels were welded to each other at 3-in. intervals for the first quarter; 6 in. for the half; and 3 in. for the last quarter.

Current for this welding operation comes through a cable 180-ft. long, the welding generators being located at street level.

The general contractor for the work was Coath & Goss, Chicago. The welding equipment was used by Chilstrom Erecting Co.



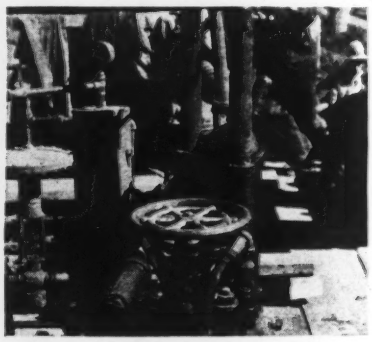
***A BETTER BOOK RACK** or holder than may be purchased in any store can be made from a wire coat hanger. The rack is easily made by following the illustrations, in order. The dimensions depend upon the type book it is to hold. For standard field books, the body may be 7 in. wide and 6 in. high, with the slot that holds the book being bent to ¾-in. width and 1-in. depth.*

A rubber band may be placed across the back of the rack if the book needs more support, and another completely around both the rack and book if the leaves tend to be unruly and not remain in place. These are not shown in the illustrations.—**J. M. WOLFE, Tuscumbia, Ala.**

Guard for Exposed Throttle

Throttle valves for steam-operated construction equipment of various kinds may easily be guarded against accidental change of valve setting by inclosing the valve handwheel in a guard which encircles the wheel but leaves the spider open for quick adjustment when necessary. The guard clamps around the steam line, carrying the iron ring on a pair of side plates with the entire unit being welded so that a pair of half-inch bolts at the base serve to fasten the guard in place. For packing or regrinding of the seat, the guard is easily removed, and as readily replaced. The guard also protects against accidental burns while working around the unit.

—M. T. PATE, *Houston, Tex.*



Throttle valve in immediate foreground protected by cheap, easily constructed guard.

Exide-Ironclads and the mining industry...

Yesterday ... a good many years ago ... storage battery locomotives powered with Exide-Ironclad Batteries sent Jack and Jenny, the faithful mine mules, out to pasture for good.

Today ... mechanized mines everywhere are using Exide-Ironclads in storage battery trammers and locomotives, in battery trailers for locomotives, in shuttle cars ... in the most powerful combination storage battery-and-trolley locomotives ever used in open-pit mining.

Operators find that Exide-Ironclads

- Deliver giant power for unusually heavy loads and steep grades.
- Maintain high voltage for fast haulage throughout the shift.
- Stand up in tough service ... no breakdowns, no repairs.
- Outlive their long guarantee by months and sometimes years.

Tomorrow ... Exide research men and engineers will continue to work with mining men toward speedier, more dependable and economical haulage.

Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

Exide IRONCLAD BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

1888 *The World's Largest Manufacturers of Storage Batteries for Every Purpose* 1941

Exide Batteries of Canada, Limited, Toronto

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

RAILWAY AND HIGHWAY RELOCATION, OREGON

OWNER: U. S. Engineer Office, Portland, Ore., Lt. Col. C. R. Moore, district engineer.

PROJECT: All work required for constructing roadbed and masonry for relocated Oregon Pacific & Eastern Railway between Stations 248+50 and 624+40.14; complete relocated Market Road No. 30 and relocated County Road No. 830, including public and private grade crossings, road approaches and right-of-way fences. Includes all clearing and grubbing, grading, bridges and culverts, highway surfacing, and right-of-way fences and gates. Site of work is in Lane County, Ore., about 6 miles southeast of Cottage Grove, in vicinity of proposed Dorena Flood Control Reservoir on Row River. Section I includes all work (except as noted) west of line normal to Sta. 369+00 on relocated railway; Section II, all work east of line noted.

CONDITIONS: Contractors to furnish all materials and complete both sections in 240 calendar days. Rail and highway transportation available. Wage rates are: skilled labor, $1.50 per hr.; semi-skilled, 75 to 90c.; and common, 62½c. Contractors to proceed with work in such a manner as not to interfere with others on project.

BIDS: Ten bids were opened on Section I May 28, 1941, ranging from the contract low of $142,906 to $181,783. Engineer's estimate, $155,738. An alternate was allowed for constructing new bridge, or moving and re-erecting existing bridge. Contract awarded on latter basis. Eight bids were received on the same day for Section II ranging from the contract low of $235,849 to $289,650. Engineer's estimate, $249,781.

Section I

LIST OF BIDDERS:

1. E. C. Hall Co., Eugene, Ore. (contract) $142,906
2. McNutt Bros., Eugene, Ore 144,347
3. J. C. Papin, Pendleton, Ore 147,300
4. Colonial Constr. Co., Spokane, Wash 149,702
5. Parker-Schram Co., Portland, Ore 164,893
6. White's Trucking Co., Walla Walla, Wash 174,161
7. Kuckenberg Constr. Co., Portland, Ore 175,648
8. Sam Orino, Portland, Ore. 176,058
9. Natt McDougall Co., Portland, Ore 179,817
10. Hauser Constr. Co., Portland, Ore. 181,783

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	34 ac.	$500.00	$300.00	$220.00
2. Roadway excav., solid rock	122,000 c. y.	.55	.58	.62
3. Roadway excavation, common	112,000 c. y.	.25	.35	.28
4. Struct. excavation, solid rock	60 c. y.	6.00	3.00	5.00
5. Struct. excavation, common	280 c. y.	2.00	1.50	5.00
6. Water, for sprinkling	400 M gal.	1.50	1.25	2.00
7. Class A concrete	50 c. y.	30.00	26.00	26.00
8. Class B concrete	25 c. y.	30.00	25.00	26.00
9 Conc. reinforced steel	5,450 lb.	.08	.07	.07
10. Bridge timber, untreated	20.5 M bm.	70.00	60.00	77.00
11. Hardware and misc. metal	400 lb.	.20	.30	.20
12. Hand placed riprap	60 c. y.	5.00	5.00	4.00
13. Dumped riprap	50 c. y.	3.00	3.00	2.00
14. 12-in. culvert pipe	700 l. f.	1.30	1.40	1.25
15. 18-in. culvert pipe	700 l. f.	2.50	2.00	2.00
16. 24-in. culvert pipe	130 l. f.	3.50	3.20	3.00
17. 36-in. culvert pipe	110 l. f.	6.00	6.15	4.50
18. Tile sub-drain	500 l. f.	.75	1.00	1.00
19. Pit run gravel base	7,800 c. y.	1.00	.80	1.20
20. Leveling course, ¾ to 0-in.	950 c. y.	2.50	1.50	2.50
21. Mineral aggregate	275 c. y.	4.00	3.00	2.75
22. RC–3 asphalt	36 ton.	30.00	23.00	30.00
23. SC–6 road oil	24 ton	30.00	23.00	30.00
24. Move, re-erect bridge, Row River	L. S.	3,500.00	2,500.00	5,441.00
25. Right-of-way fence	1,710 rod	2.00	1.25	1.25
26. Right-of-way fence gates	8 ea.	30.00	25.00	20.00
27. Highway guard posts	100 ea.	2.50	3.00	3.00
28. Constr. new bridge (Alt. item 24)	L. S.	4,500.00	3,500.00	6,300.00

Section II

LIST OF BIDDERS:

1. McNutt Bros., Eugene, Ore. (contract) $235,849
2. E. C. Hall Co., Eugene, Ore 245,584
3. Colonial Constr. Co., Spokane, Wash 246,897
4. Parker-Schram Co., Portland, Ore. 261,010
5. Sam Orino, Portland, Ore 263,073
6. White's Trucking Co., Walla Walla, Wash 271,695
7. Kuckenberg Constr. Co., Portland, Ore 281,894
8. Natt McDougall Co., Portland, Ore 289,650

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	90 ac.	$280.00	$500.00	$400.00
2. Roadway excavation, solid rock	156,000 c. y.	.53	.55	.65
3. Roadway excavation, common	242,000 c. y.	.35	.25	.25
4. Struct. excav., solid rock	50 c. y.	3.00	6.00	3.00
5. Struct. excav., common	550 c. y.	1.50	2.00	1.50
6. Water for sprinkling	675 M gal.	1.00	1.50	2.00
7. Class B concrete	21 c. y.	26.00	30.00	30.00
8. Timber piles	400 l. f.	1.00	1.25	1.25
9. Bridge timber, untreated	36 M bm.	60.00	75.00	90.00
10. Bridge timber, creosoted	19 M bm.	95.00	125.00	125.00
11. Hardware and misc. metal	4,300 lb.	.20	.20	.25
12. Hand placed riprap	60 c. y.	5.00	6.00	3.50
13. Dumped riprap	50 c. y.	3.00	3.00	2.00
14. 12-in. culvert pipe	1,120 l. f.	1.40	1.30	1.60
15. 18-in. culvert pipe	1,110 l. f.	2.00	2.50	2.00
16. 24-in. culvert pipe	530 l. f.	3.20	3.50	3.00
17. 30-in. culvert pipe	440 l. f.	4.05	6.50	4.00
18. 42-in. culvert pipe	360 l. f.	7.15	9.00	7.00
19. Tile sub-drain	500 l. f.	1.00	.75	.75
20. Pit run gravel base	12,300 c. y.	.80	1.00	1.00
21. Leveling course, ¾ to 0-in	3,100 c. y.	1.50	2.00	1.50
22. Mineral aggregate	1,200 c. y.	3.00	3.00	2.50
23. RC–3 asphalt	112 ton	23.00	30.00	23.00
23. SC–6 road oil	73 ton	23.00	30.00	23.00
24. Right-of-way fence	1,770 rod	1.25	2.00	2.00
25. Right-of-way fence gates	14 ea.	25.00	30.00	35.00
25. Highway guard posts	50 ea.	3.00	2.50	2.00

WATER SUPPLY SYSTEM LAS VEGAS, NEVADA

OWNER: U. S. Engineer Office, Los Angeles, Calif.

PROJECT: Construction of water supply system at Las Vegas Airport, approximately 8 miles northeast of Las Vegas, Nev. Involves building of valve house at site of existing artesian well, approximately 5 miles of gravity flow pipe line, and pumping plant, including ground storage tank and appurtenant facilities. Work includes following principal items: excavation, filling and grading; concrete; pipe laying; furnishing and installing pumping equipment and steel water storage tank; electrical work; painting; and cleaning-up.

CONDITIONS: Contractor to furnish all materials and complete work in 70 days. Rail and highway transportation facilities available. Wage rates are: skilled labor, 90c. to $1.50 per hr.; semi-skilled, 62½c. to $1.00; and common labor, 62½c.

BIDS: Five bids were opened May 19, 1941, ranging from the contract low of $99,905 to $123,629.

LIST OF BIDDERS:

1. Vinson & Pringle, Phoenix, Ariz. (contract) $99,905
2. H. B. Nicholson, Los Angeles, Calif. 103,570
3. Fritz Ziebarth, Long Beach, Calif. 104,637
4. Charles J. Dorfman, Los Angeles, Calif. 107,546
5. R. A. Wattson Co., and Gogo & Rados, Los Angeles, Calif. 123,629

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Pump house and appurtenances	L. S.	$34,642.24	$37,466.00	$38,378.00
2. Valve pit at Well No. 2	L. S.	664.85	675.00	700.00
3. 10-in. gravity supply line	27,680 l. f.	2.28	2.30	2.30
4. 10-in. gave valves in supply line	3 ea.	117.30	150.00	135.00
5. Air and vacuum valves and manholes on supply line	9 ea.	79.58	60.00	90.00
6. 6-in. blow-off connection	1 ea.	246.87	275.00	380.00
7. 15-in. corr. met. pipe sleeve	50 l. f.	3.45	10.00	6.00

'INCOR' SPEEDS HIGHWAY PROGRAM

—3 DAYS FROM CASTING TO DRIVING

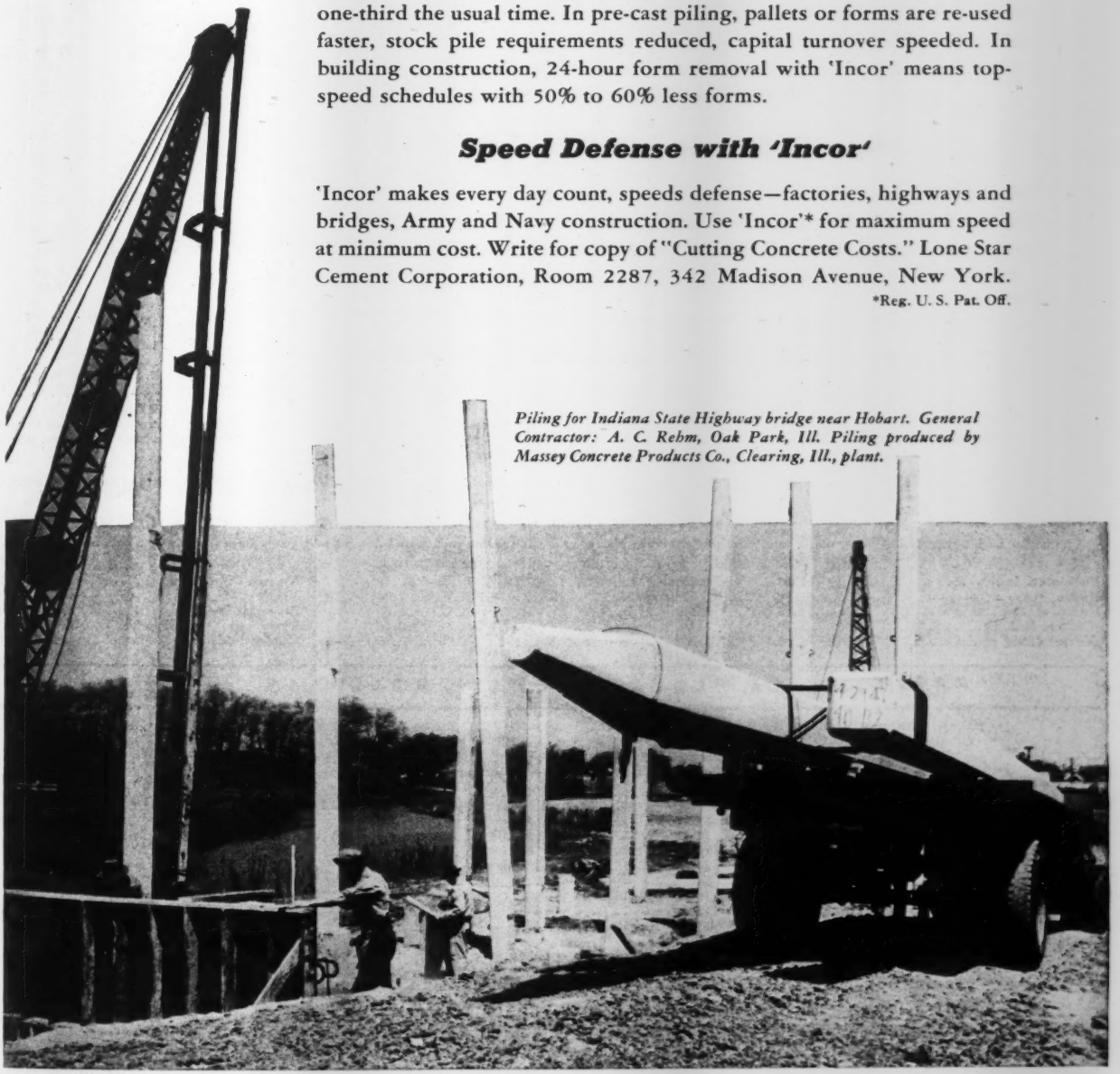
PILING for bridge on Indiana State Highway, near Hobart, cast April 29, 1941 (see date on pile at right), was delivered to job site May 2. Three days from casting to pile-driver! Typical 'Incor' performance in speeding the Nation's highway program.

'Incor' produces the speed needed to win, by curing or hardening in one-third the usual time. In pre-cast piling, pallets or forms are re-used faster, stock pile requirements reduced, capital turnover speeded. In building construction, 24-hour form removal with 'Incor' means top-speed schedules with 50% to 60% less forms.

Speed Defense with 'Incor'

'Incor' makes every day count, speeds defense—factories, highways and bridges, Army and Navy construction. Use 'Incor'* for maximum speed at minimum cost. Write for copy of "Cutting Concrete Costs." Lone Star Cement Corporation, Room 2287, 342 Madison Avenue, New York.

*Reg. U. S. Pat. Off.



Piling for Indiana State Highway bridge near Hobart. General Contractor: A. C. Rehm, Oak Park, Ill. Piling produced by Massey Concrete Products Co., Clearing, Ill., plant.

LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • KANSAS CITY • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

Increases in lumber prices provide the most important change in the construction material price list for August. Pine is up $5.50 to $8.00 in Atlanta; up $2.00 to $8.50 in Birmingham; $2.00 to $5.00 higher in Boston; $1.00 to $4.00 higher on most sizes in Cleveland; up $1.00 to $2.00 in Denver, $5.00 in Kansas City, $6.00 on 1-in. sizes in Minneapolis; $4.00 to $9.00 higher in New York; and $2.00 to $6.00 higher in St. Louis.

Douglas fir increases from $2.00 to $5.00 in Boston; is up $4.50 to $7.50 in Kansas City, $3.50 to $5.00 in Minneapolis, and $10.00 to $11.50 in New York.

Cement, sand and gravel, and crushed stone are unchanged in all twenty cities. Ready-mixed concrete climbed 25c. per cu. yd. in Philadelphia, and 75c. in Pittsburgh. Paving asphalt is up $2.00 per ton in Cleveland.

Structural steel shapes rose 70c. per 100-lb. in Dallas, and reinforcing bars are higher in New York. Structural clay tile prices increased in Atlanta, Dallas and Pittsburgh.

The Montreal rate for common labor on buildings is now 50c. per hour, an increase of 5c. over last month; and common labor on heavy construction is up 4c., the new rate being 44c. per hour.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT (Per bbl., carload lots, including 40c per bbl. for bags, cash discount not deducted)			SAND AND GRAVEL (Per ton, carload lots)			CRUSHED STONE (Per ton, carload lots)		CRUSHED SLAG (Per ton, carload lots, f.o.b. plant)		CONCRETE (Ready Mixed 1:2:4, 50 c.y. or more, delivered)
	Cloth Bags *a*	Paper Bags	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	
Atlanta	$2.90	$2.66	$2.61	$1.75	$1.85	$1.95	$1.75	$1.85	$1.55	$1.65	$7.90
Baltimore	2.36	2.11	1.91	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	7.00
Birmingham	2.50	2.25	2.05	1.75	1.75	1.50	1.00	1.00	.90	1.15	5.80
Boston	2.75*b*	2.50*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	7.00*m*
Chicago	2.60	2.35	2.20	2.00‡*d*	2.00‡*d*	2.00‡*d*	2.00‡*d*	2.00‡*d*	1.25‡	1.25‡	....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	6.60
Cleveland	2.29	2.04	....	1.50*i*	1.50*i*	1.30*i*	1.90*i*	1.90*i*	1.70*i*	1.70*i*	7.30*i*
Dallas	2.47	2.22	2.02	1.75*p*	2.00*p*	1.25*p*	1.69*p*	1.84*p*	....	....	6.20
Denver	3.08	2.83	....	1.20	1.40	.90	....	....	....	....	7.25
Detroit	2.24	1.99	1.79	1.31	1.41	.91	1.50	1.50	1.65‡	1.65‡	6.50
Kansas City	2.56	2.31	2.16	1.85	2.30	1.00	1.91	1.91	....	....	7.25*n*
Los Angeles	2.25*b*	2.05*b*	....	1.00	1.00	1.00	1.00*f*	1.00*f*	....	....	5.85
Minneapolis	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	7.35*j*
Montreal	....	1.95*rs*	1.79*rs*	....	....	1.25‡*t*	.85‡*ct*	1.00‡*ct*	....	....	6.45*ls*
New Orleans	2.41	2.16	1.96	1.50	1.50	1.25	....	....	....	....	7.25
New York	2.55‡	2.30‡	....	1.50*de*	1.50*de*	.90*de*	1.65*de*	1.75*de*	....	....	6.75
Philadelphia	2.32	2.07	1.87	1.55‡	1.65‡	1.35‡	....	....	1.10	1.10	8.20*k*
Pittsburgh	2.44	2.19	1.99	1.40‡	1.40‡	1.70‡	2.25‡	2.25‡	1.50	1.50	8.25
St. Louis	2.55	2.30	....	1.50‡	1.50‡	1.25/1.50‡	1.10*h*	1.10*h*	.75*g*	.75*g*	7.75
San Francisco	2.16	1.96	1.66	1.36	1.36	1.36	1.46	1.46	....	....	6.95
Seattle	2.95*o*	2.70*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount 35c. 500 to 2000; 70c. 2000 to 5000; 95c. over 5000. *l* Up to 200cu. yd. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

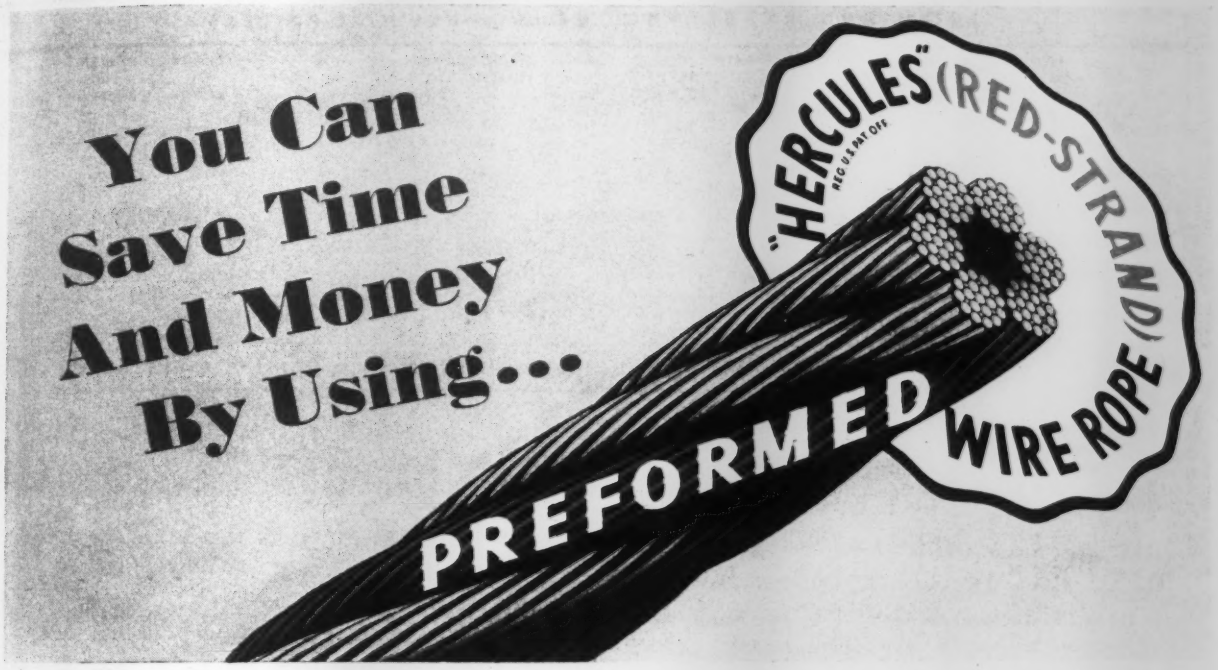
	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind.	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn.	$1.80	$1.75
Dallas, Tex. (Inc. 10c. tax)	1.85	1.80	Limedale, Ind.	1.70	1.65	Steelton, Minn.	1.80	1.75
Hannibal, Mo.	1.70	1.65	Norfolk, Va.	1.65	1.60	Universal, Pa.	1.65	1.60
Hudson, N. Y.	1.75	1.70	Northampton, Pa.	1.55	1.50	Waco, Tex (10c. tax in Tex.)	1.75	1.70
Independence, Kans.	1.70	1.65	North Birmingham, Ala.	1.70	1.65	Montreal (8% sales tax incl.)	1.68	1.67

PAVING BRICK, BLOCKS, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICKS AND BLOCKS			PAVING ASPHALT (Per ton, less than 80 penetration)		ASPHALT BINDERS—FLUXES (Per gal., 80-300 penetration)		CUTBACK ASPHALT (Per ton)		ROAD OILS (Per gal.)	ASPHALT EMULSION (Quick-breaking) (Per gal.)	
	Granite per M. lots of 50,000 4x4x8 in.	Brick per M. 3-4x8-8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$17.30*e*	$23.83*e*	$0.0695*e*	$0.1018*e*	$0.0734*he*	$0.1257*h*	$0.0634*e*	$0.0734	$0.1257
Baltimore	165.00‡	45.00‡	2.90	14.00	20.00	.06	.09	.065*h*	.115*h*	.....	.....	.....
Birmingham	.....	27.50*fj*‡	....	18.20	23.20	.0747	.1047	.0834*h*	.1484*h*	.....	.....	.....
Boston	90.00	48.50	3.50	14.00	20.00	.06	.09	.065*h*	.115*h*	.065	.09‡	.12‡
Chicago	150.00	50.00	1.85*d*	14.50	18.50	13.00*g*	17.00*g*	.06*h*	.10*h*	.05	.095	.13
Cincinnati	112.00	37.50	....	14.00	18.00	.08	.....	16.80	.....	.0625	.....	.085
Cleveland	110.00	39.00	2.25	17.00	22.00	.085	.095	.0825*h*	.0925*h*	.0575	.075	.085
Dallas	.....	36.00	....	13.25	20.30	.06	.103	15.00	24.80	.055	.05/.07	.07/.09
Denver	.....	27.50	....	....	.....	.....	.....	.....	.....	.....	.....	.....
Detroit	.....	35.00	....	14.10*f*	19.00*f*	.061	.1025	14.10	18.60	.0425	.0645	.098
Kansas City	.....	40.00	....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
Los Angeles	.....	50.00	....	6.50*b*	15.00	6.50*bg*	15.00*bg*	5.50*b*	.....	.0192	.0525	.1125
Minneapolis	.....	.....	1.90*d*	21.20	25.70	.10	.12	19.00	29.50	.06	.....	.....
Montreal	75.00*k*	.....	3.62*k*	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.1355*hk*	.08*k*	.135*k*	.188*k*
New Orleans	.....	.....	....	14.00*a*	19.00*a*	.055	.085	.06*h*	.09*h*	.....	.078	.....
New York	.....	.....	2.90	15.00	21.00	.06	.09	.065*h*	.115*h*	.....	.....	.....
Philadelphia	120.00	42.50	2.84	15.00	22.00	.06	.12	.07*h*	.13*h*	.06	.07	.13
Pittsburgh	135.00	38.75	....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis	115.00/125.00	37.00	....	14.00	19.00	14.00*g*	19.00*g*	.06*h*	.095*h*	.04	.09	.125
San Francisco	.....	70.00	....	6.50	15.00	6.50*g*	15.00*g*	7.00	17.50	.025	.0525	.1125
Seattle	.....	60.00*c*	....	15.70	24.10	.....	24.10*g*	10.50/11.50	24.00/25.00	9.75*g*	.0575*i*	.130*ei*

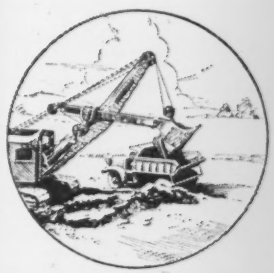
‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 6 to 8-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3¾x8½ in. *k* tax included.

You Can Save Time And Money By Using...



Now that continuous and efficient production is more important than ever, are you cashing in on the advantages of Preformed "HERCULES" (Red-Strand) Wire Rope? Actual records show that its easy handling, smooth spooling and long life mean a definite saving in both time and money.

When you buy Preformed "HERCULES" (Red-Strand) Wire Rope, you get a Preformed wire rope of the very highest quality — not only as to quality of material, but fabrication as well. As it is furnished in both Round Strand and Flattened Strand constructions, there is a right rope for every heavy duty purpose.



Why not take advantage of the time and money saving possibilities of Preformed "HERCULES"? Try it, then compare its performance record with that of any other rope you have ever used.

We especially recommend the Preformed type of "HERCULES" (Red-Strand) Wire Rope for use on backfillers, bulldozers, carryall scrapers, clamshells, conveyors, cranes, draglines, dredges, hoists, shovels, skimmers and trench hoes.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK . . . 90 West Street
CHICAGO . . 810 W. Washington Blvd.
DENVER . . . 1554 Wazee Street

SAN FRANCISCO . . 520 Fourth Street
PORTLAND . . 914 N. W. 14th Avenue
SEATTLE . . 3410 First Avenue South

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ½-in. billet *b*	RIVETS ½-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *c*	Tie Plates *c*	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.25‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.45*a*	2.50*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	.....	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates, alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per c.l.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¾ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH—Per 100 sq.yd.. carload lots— Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING—Per 100 s.f.. carload lots— 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd.	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.39	$2.39	.02½	.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	.....	.10	28.00	29.50	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	22.50	1.80	1.34	.1701	....
Boston	3.75	3.11	3.01	$20 C.L.	.10	17.00	19.00	1.76	1.31	.1656	2.77
Chicago	2.10*a*	2.15	2.15	.03	.05	20.50	22.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.51*cd*	2.41*cd*	.....	.05	19.00	21.00	1.66	1.25	.1566	....
Cleveland	3.58*g*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	....
Dallas	6.00	3.40	3.40	.....	.....	24.50	26.50	1.93	1.42	.1827	....
Denver	4.35	3.95	3.80	.....	.....	24.50	26.50	1.97	1.45	.1863	....
Detroit	3.65‡	2.25	2.15	.....	.10	22.00	24.00	1.68	1.26	.1584	2.66
Kansas City	4.17	2.51*cd*	2.36*cd*	.0	.05	18.50	21.00	1.78	1.33	.1683	2.86
Los Angeles	3.65*f*	2.25	2.10	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.80‡	2.48*c*	2.48*c*	.0	.10	21.50/22.50	23.50/24.50	1.80	1.34	.1701	2.73*d*
Montreal	3.90*i*	2.65*i*	2.55*i*	.....	.....	26.00*hi*	33.00*hi*	2.58*i*	3.22*i*	.264*i*	
New Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1719	2.875
New York	3.75	2.76*c*	2.76*c*	.....	.15	18.50	20.50	1.76	1.32	.1665	2.74
Philadelphia	3.75	2.66	2.56	.....	.....	19.50	21.50	1.71	1.28	.1611	2.72
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
St. Louis	3.69	2.39	2.39	.0	.05	22.50	26.00	1.69	1.27	.1602	2.70
San Francisco	4.70	2.65	2.50	.02½	.10	19.00	25.50	1.93	1.42	.1827	3.25
Seattle	2.75*e*	2.50*e*	.....	.....	.....	25.50	27.50	1.93	1.42	.1827	2.95*e*

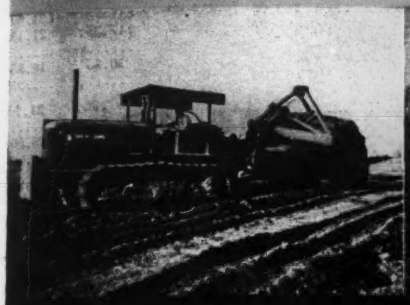
‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* F.o.b. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. High scrap steel prices cut former 15c. differences between new billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Butt Weld Black %	Galv. %	3½ to 6in.; Lap Weld Black %	Galv. %
Atlanta	$49 40	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	62.2	54.2	59.7	51.2
Baltimore	52.80	.45	.70	2.50	6.90	120.00	160.00	.75	2.00	65.5	57.5	63.0	54.5
Birmingham	45.00	.26	.468	1.7875	4.66	85.00	220.00	.40	1.60	62.2	54.2	59.7	51.2
Boston	55.00	.203	.4455	1.98	5.64	115.50‡	228.50‡	.45	1.69	64.1	56.1	61.6	53.1
Chicago	53.80	.28	.54	2.25	6.25	100.00‡	150.00‡	.38	1.48	67.0	59.0	63.5	55.0
Cincinnati	52.70	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	65.9	57.9	63.4	54.9
Cleveland	54.24	.196	.378	1.485	4.715	69.00	108.00	.35	1.50	67.8	59.8	65.3	56.8
Dallas	58.20	.305	.549	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	60.60	.24†	.52†	2.16†	.....	130.00	240.00	....	....	58.4	50.4	55.7	47.2
Detroit	54.24	.245	.4725	1.935	4.408	66.45	105.00	.33	1.50	66.3	58.3	63.8	55.3
Kansas City	55.12	.30	.54	2.16	5.00	120.00	240.00	.45	1.60	62.9	54.9	60.0	51.5
Los Angeles	55.00	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	59.6	51.6	57.0	48.6
Minneapolis	57.20	.25†	.45†	1.80 †	4.60†	.....	.....	.70	1.80	64.2	56.2	60.7	52.2
Montreal	60.00	.55	.90	3.68	5.95*e*	135.00‡	260.00‡	.48*l*	1.92*l*	.....	.....	.....	.....
New Orleans	51.38	.26	.48	1.69	.....	150.00	220.00	.37	2.10	62.4	54.4	58.8	50.3
New York	52.20	.455	.8775	2.925	7.65	.....	.....	.50	1.20	64.9	56.8	62.4	53.9*i*
Philadelphia	50.90	.....	.....	.....	.....	.....	.....	.54	1.80	65.3	57.3	62.8	54.3
Pittsburgh	55.60	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	54.5
St. Louis	52.48	.28	.504	2.016	4.50	85.00	170.00	.75*j*	1.80*k*	65.1	57.1	62.0	53.5
San Francisco	55.00	.3275*d*	.5895*d*	2.358	5.895	107.25	178.75	.54	2.50	45.0	31.0	47.0	34.5
Seattle	55.35	.35	63	2.52	6.30	72.00	175.00	.35*f*	1.30*f*	.....	.....	.....	.....

‡ Delivered. † F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ¾ in., 8½c.; 1 in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1¼ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½ in.; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec C 76-37. *k* Reinforced; spec. C 75-37. *l* Plus sales tax.

POWER THAT PAYS



HD-14 and Gar Wood cable scraper, speeds up hauling.

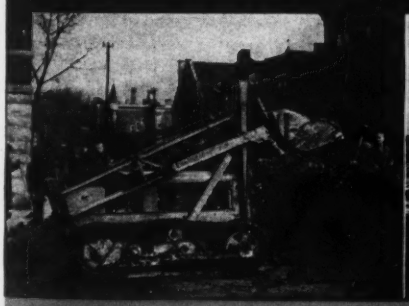
Accurate bank trimming with the new Model AD Motor Grader.

E-60 Power Unit runs this gravel plant at big savings.

ON Every JOB!

Today's highball construction schedules call for power equipment that can deliver the highest possible output per hour of work; equipment that gets to work quickly, *stays* on the job and *gets* more done. Check up on your job to see where modern, up-to-date equipment can help you step up schedules and reduce costs. Yesterday's finest power equipment may be seriously inadequate for today's job ... a handicap you can avoid by checking up NOW. Shown here are types of Allis-Chalmers machines engineered to meet *today's* requirements. Your Allis-Chalmers dealer will gladly show you where and how they can do *your* job faster, at lower cost.

"WM" and Hough Shovel saves time on a sewer construction job.



HD-14 and cable 'dozer clears way for new airport cantonment.

Model "IU" and Roustabout crane speeds up handling of timbers.

ALLIS-CHALMERS POWER

TRACTOR DIVISION · MILWAUKEE · U. S. A.

TRACTORS, ENGINES, ROAD MACHINERY

IT DOESN'T COST .. *it Pays!*

LUMBER, TIMBER, PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face)									LONG LEAF Y. P. Merchantable grade		PLYWOOD* Rail freight increment (See note for base price)	
	All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)									up to 20 ft.			
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	5/8"	1/4"
Atlanta	**$29.00**	**$29.00**	**$26.00**	**$28.00**	**$28.50**	**$30.00**	**$43.00**	.....	.....	**$50.00**	**$55.00**	**$17.75**	$21.60
Baltimore	**41.00**	**42.00**	**40.00**	**41.00**	**41.00**	**44.00**	**55.00**	.....	.....	85.00	90.00	17.35*g*	21.15*g*
	43.00	*43.00*	*43.00*	*43.00*	*44.00*	*45.00*	*55.00*	*$57.00*	*$58.00*	.....	.....	.....	.....
Birmingham	**34.50**	**34.50**	**31.00**	**30.00**	**31.00**	**32.00**	**50.00**	**49.00**	**52.00**	.....	.....	16.25	19.85
[1]	37.50	37.50	35.00	35.00	35.00	40.00	58.00	.....	.....	65.00	67.50	.....	.....
Boston	42.00[2]	42.00[2]	42.00[3]	48.00	65.00[3]	70.00[3]	85.00[3]	.....	.....	85.00	85.00	17.35*g*	21.15*g*
	42.00	*42.00*	*42.00*	*48.00*	*48.00*	*48.00*	*55.00*	*55.00*	*60.00*	.....	.....	.....	.....
Chicago	**42.00**	**42.00**	**41.00**	**41.00**	**41.00**	**42.50**	**52.50**	.....	.....	90.00	100.00	13.80	16.80
	40.00	*40.00*	*40.00*	*40.00*	*40.00*	*44.00*	*47.00*	*48.00*	*48.00*	.....	.....	.....	.....
Cincinnati	**37.50**	**39.00**	**38.00**	**38.00**	**38.00**	**41.00**	**50.00**	.....	.....	60.00	63.00	16.25	19.85
	.....	.....	.....	.....	.....	.....	*52.00*	*52.00*	*52.00*	.....	.....	.....	.....
Cleveland	**42.00**	**42.00**	**42.00**	**42.00**	**42.00**	**47.00**	**55.00**	55.00	55.00	90.00	90.00	16.70	20.40
Dallas *e*	**38.00**	**39.00**	**38.00**	**36.00**	**37.00**	**38.50**	**52.50**	**52.50**	**52.50**	76.00	81.00	13.90	16.95
Denver ‡	51.00[4]	49.00[4]	52.00[4]	51.00[4]	51.00[4]	53.00[4]	52.00[4]	62.00[4]	69.00[4]	.....	.....	9.90	12.05
Detroit	**42.50**	**42.50**	**41.00**	**42.50**	**42.50**	**44.50**	**51.00**	.....	.....	50.00	59.00	16.25	19.85
	.....	.....	.....	.....	.....	*49.00*	*52.00*	*59.00*	*59.00*	.....	.....	.....	.....
Kansas City	**45.00**	**45.00**	**42.50**	**42.50**	**42.50**	**45.00**	**50.00**	.....	.....	70.00	75.00	12.25	14.95
	47.50	*47.50*	*45.00*	*45.00*	*45.00*	*47.50*	*47.50*	*52.50*	*52.50*	.....	.....	.....	.....
Los Angeles *a*	*40.00*	*40.00*	*39.00*	*39.00*	*36.00*	*36.00*	*45.00*	*48.00*	*45.00*	.....	.....	9.35*gh*	11.35*gh*
Minneapolis ‡*b*	46.00[6]	46.00[6]	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.05	14.70
‡	*46.50*	*46.50*	*46.50*	*44.50*	*44.50*	*46.50*	*51.50*	*59.00*	*59.00*	.....	.....	.....	.....
Montreal †[7]	*36.00*	*38.00*	*36.00*	*38.00*	*40.00*	46.00	.....	.....	.....	155.00	165.00	.....	.....
	53.50	*53.50*	*54.25*	*54.25*	*59.25*	*59.25*	*65.00*	*65.00*	*65.00*	.....	.....	.....	.....
New Orleans	**24.00**	**25.00**	**25.00**	**24.00**	**24.00**	**25.00**	**46.00**	.....	.....	62.00	69.00	13.90	16.95
	29.00	*29.00*	*32.00*	*33.00*	*35.00*	*34.00*	*56.00*	.....	.....	.....	.....	.....	.....
New York ‡	**48.00**	**49.00**	**50.00**	**51.00**	**52.00**	**54.00**	**59.00**	.....	.....	95.00*f*	100.00*f*	17.35*g*	21.15*g*
‡	.....	.....	*65.00*	*65.00*	*65.00*	*65.00*	*67.50*	*70.00*	*70.00*	.....	.....	.....	.....
Philadelphia	**24.00**	**24.50**	**25.50**	**25.50**	**27.50**	**27.50**	**29.00**	.....	.....	50.00	57.50	17.35*g*	.1512*g*
	35.00	*36.50*	*39.00*	*38.25*	*29.00*	*39.00*	*44.00*	*32.00*	*32.00*	.....	.....	.....	.....
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	.....	.....	.....	.....	17.00	20.70
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	.....	.....	.....	.....
St. Louis ‡*c*	**44.00**	**45.00**	**42.00**	**41.00**	**42.00**	**44.00**	**54.00**	*62.00*	*62.00*	76.00	77.00	13.90	16.95
San Francisco *d*	*32.00*	*31.00*	*32.00*	*33.50*	*33.00*	*33.50*	*33.50*	*32.00*	*32.00*	.....	.....	7.30*g*	8.90*g*
Seattle	*37.00*	*37.00*	*37.00*	*37.00*	*37.00*	*37.00*	*36.00*	*36.00*	*36.00*	.....	.....	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [6] Western Pine, No. 3 Common. [7] Spruce. *Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* At ship's tackle. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax.

NOTE: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on 5/8", $86.50; on 3/4", $95.30; price includes oiling and sealing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *Many mills out of market due to rush of defense orders. *g* Lower rate by water shipment. *h* 50,000 lb. minimum

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness		EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*	
	A quality	B quality		
Atlanta	75%	75%	$0.15	
Baltimore	82%	81%	.15	
Birmingham	75%	75%	.105	
Boston	78%	79%	.15	
Chicago	79%	79%	.15	
Cincinnati	77%	77%	.15	
Cleveland	77%	77%	.19	
Dallas	78%	78%	.1625	
Denver	77%	77%	.155*e*	
Detroit	79–10%	79–10%	.15	
Kansas City	77–10%	77–10%	.155	
Los Angeles	86%*d*	88%*d*	.1575	
Minneapolis	76%	76%	.155	
Montreal	40–10%‡	50–5%‡	.155†	
New Orleans	70%	75%	.16	
New York	81%	82%	.22*f*	Price of 60% Ammonia Gelatin is $0.01 per lb. higher than 40%
Philadelphia	82–10%*d*	83–10%*d*	.15	
Pittsburgh	79%	79%	.1225	
St. Louis	77–10%	77–10%	.155	
San Francisco	78%*d*	83%*d*	.155	
Seattle	75%	76%	.1575†	

a Disc. from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Plus sales tax.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip. † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, and Fla	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1525‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1150	.135 –.1425	.155 –.1625

‡F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, pine, with bark on, f.o.b. New York; delivered from barge 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Short Barge	Leaf Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.22	$0.195
12 in.— 2 ft. from butt	6 in.	50 to 59 ft.	.26	.24
12 in.— 2 ft. from butt	6 in.	60 to 69 ft.	.28	.255
14 in.— 2 ft. from butt	6 in.	50 to 69 ft.	.30	.265
14 in.— 2 ft. from butt	6 in.	70 to 79 ft.	.36	.275
14 in.— 2 ft. from butt	5 in.	80 to 85 ft.	.42	.415
14 in.— 2 ft. from butt	5 in.	85 to 89 ft.	.45	.482

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8'6" Untr.	7"x9"x8'6" Tr.
Boston	Oak	$1.30	....	$1.80	....
	Pine	1.60	$2.40*a*	2.40	$3.40*a*
New York	S. L. Sap Pine	1.20/1.30	1.95	1.60	2.55
	Mixed Oak	1.55	2.05	2.00	2.65
Birmingham	White Oak	.85	1.50*a*	1.35	1.70*a*
	Southern Pine	.55*b*	1.10*ab*	.70	1.30*a*
Chicago	Oak	....	1.65*a*	....	2.25*a*
	Southern Pine	....	1.53*a*	....	2.13*a*
Los Angeles	Douglas Fir	.64	1.38*a*	.90	1.80*a*
Philadelphia	Red Oak	1.10	....	....	2.40*a*
St. Louis	White Oak	1.40	....	1.75	....
	Red Oak	1.40	1.85*a*	1.75	2.35*a*
	Sap Pine or Cypress	1.30	....	1.65	....
San Francisco	Douglas Fir	1.00*bef*	....	....	2.45*caf*
Montreal	Birch or Maple	.65	1.05*a*	.75	1.35*a*

Tr.— Treated; Untr.— Untreated. *a* Creosoted. *b* 6" x 8" x 8'6". *c* Empty cell. *d* Zinc. *e* Green. *f* At ships tackle.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.00–2.85
Chlorine cylinders, liquid, per lb. delivered	.0525
Calcium chloride, 77–80%, flaked, in 400-lb. drums or 100-lb. moisture proof bags, delivered, per ton	20.50–35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.10
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00
Sulphate of copper, in bbl., per 100-lb	4.75

NEW NAVAL AIR BASE

Needs 370,000 yards sand and gravel

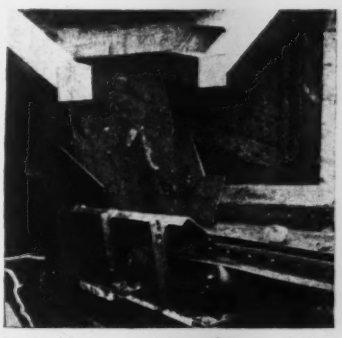
The 18" x 30" *Telsmith Roller Bearing Jaw Crusher* (center background) crushes the plus 4" material rejected by the *Telsmith Rotary Grizzly*; and a No. 36 *Telsmith Gyrasphere Crusher* (left foreground) crushes 2½" to 4" rejected by *Single Deck Telsmith Pulsator* vibrating screen.

THIS TELSMITH PLANT RUNS 20 HOURS A DAY TO SUPPLY IT

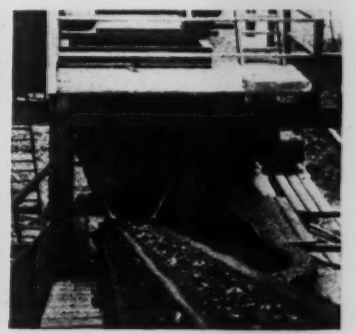
The Navy's new 25 million dollar air base at Quonset Point, R. I., will require about 370,000 yards of washed sand and gravel. This aggregate is being furnished by the Boston Sand & Gravel Co. of Cambridge, Mass., with a brand new and completely modern Telsmith Plant located near East Greenwich, R. I.

Telsmith engineers, in co-operation with the Boston Company officials, designed the plant especially for this job, and all major equipment was furnished by Telsmith. A capacity of 150 T.P.H. was figured, but the plant produces as high as 250 T.P.H. Average production is 200 T.P.H. of Navy 1" and 2" aggregate and concrete sand—4000 tons per 20-hour day, with plant operating at times at temperature as low as 16° F.

For dependable advice and quick service coupled with the best in equipment, bring your problem to Telsmith. *Write for descriptive Bulletin G-2.*



Under hopper with rail-bar grizzly, 30" x 5'6" *Telsmith Plate Feeder* regulates flow of material onto belt conveyor feeding scalping and crushing plant.



Throughs from a No. 450 *Telsmith Rotary Grizzly* flow over a 5' x 10' *Telsmith Single Deck Pulsator* and minus 2½" goes to washing and screening plant.

Both crushers discharge onto a return conveyor and, at point of transfer to main conveyor, a 3' x 8' *Telsmith Double Deck Pulsator* removes fines.

60" x 18' *Telsmith Standard Washing Screen* scrubs and sizes gravel. 48" x 24' and 36" x 20' *Telsmith Sand Drags* wash and dewater sand.

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE — PARTITION — SCORED			STRUCTURAL CLAY TILE — LOAD BEARING — SCORED			BRICK		LIME		
	Per M. lots of 2,000 pieces or over.			Per M. lots of 2,000 pieces or over.			Per M. in quantity.		Per ton,	In paper,	Carload lot,
	3x12x12 in.	4x12x12 in.	8x12x12 in.	8x12x12 in.	10x12x12 in.	12x12x12 in.	Common backing	Straight hard	Hydrated finishing	Common hydrated	Pulverized or lump
Atlanta	$100.00	$110.00	$195.00	$230.00	$240.00	$240.00	$13.00	$18.00	$26.50	$17.00	$17.00
Baltimore	80.00	85.00	160.00	190.00	240.00	295.00	14.00*k*	17.00*k*	19.00	16.25	2.50*m*
Birmingham	80.00	85.00	160.00	191.00	252.00	285.00	14.00	17.00	18.11	12.64	1.66*o*
Boston	98.70*a*	105.30*a*	206.85*a*	236.15	310.85*a*	346.00*a*	17.00*i*	20.00*i*	20.00	15.40	18.00*l*
Chicago	68.10	72.60	135.90	185.70	234.90	268.10	11.50	12.50	16.40	14.40	12.20
Cincinnati	62.40	66.50	124.75	149.70	187.90	214.75	16.00	16.00	15.40	12.90	.....
Cleveland	56.50	60.00	112.50	135.00	182.00	209.00	16.00	16.00	15.00*j*	12.00*j*	2.75*m*
Dallas	52.00	54.00	100.00	135.00	200.00	263.00	11.50*i*	13.50*i*	19.00	15.00	.95*m*
Denver	84.80	94.40	152.70	178.20	212.00	227.90	13.50	17.00	30.00*j*	19.00*j*	30.00*j*
Detroit	69.00	73.60	138.00	176.00	232.00	265.00*e*	16.50	17.00	16.50	13.90	14.90
Kansas City	64.50	66.50	86.00*c*	125.50	159.75	186.25	15.50	24.00	19.10	12.80	10.70
Los Angeles	73.50†*r*	89.50†*r*	128.00*c*†*r*	210.00†*r*	368.00†*r*	460.00†*r*	13.50	15.00	16.50	17.50	17.50
Minneapolis	71.45	76.20	143.95	171.45	173.80	242.10	13.10	15.16*q*	21.00*q*	16.00	19.00
Montreal	72.20*au*	77.50*au*	142.50*au*	76.00*au*	165.80*au*	248.70*u*	17.50†*u*	24.25†*u*	23.50*u*	17.00*u*	12.00*u*
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	78.40	83.60	115.00*c*	193.30*h*	238.80*h*	295.60*h*	13.00	.....	19.00	14.00	17.00
Philadelphia	80.50	85.90	161.10	193.30	238.80	295.60	17.00*s*	19.00*s*	15.70*q*	10.05*q*	12.05*q*
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	25.00	17.90	15.40	2.55*m*
St. Louis	62.00	88.00	120.00	180.00	234.00	280.00	17.00	18.00	22.00	16.00	2.30*m*
San Francisco	84.00	94.50	225.00	.....	.....	.....	14.00	17.00*s*	.75*o*	2.05*o*	16.40
Seattle	100.00	110.00	220.00	.....	.....	.....	17.50*f*	22.00*f*	20.00*s*	20.00*s*	20.00*s*

† F.o.b. *a* Smooth. *b* Carload lots delivered to job. *c* 6x12x12 in. *d* Not load bearing. *e* 48 lb. tile. *f* Less $1.00, ½ cash 15 days, balance 30 days. *g* Selected common. *h* F.o.b. Perth Amboy, N. J. *i* 50c. per M. off for cash. *j* LCL. *k* $1.00 discount if paid in 10 days. *l* Lump. *m* Per bbl., 180 lb. *n* Per sack 100 lb. *o* Per bbl., 200 lb. *p* 280 lb. bag. *q* 25-ton cars. *r* 5% discount 10 days. *s* 2% off cash. *t* 5½ x 8 x 12. *u* Plus 8% sales tax.

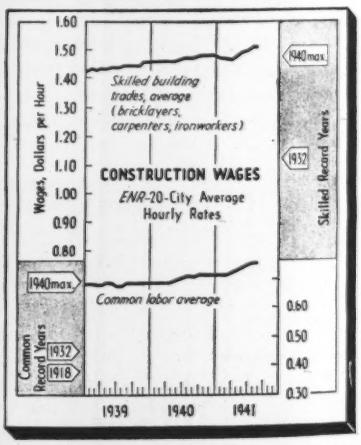
PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD	WHITE LEAD	READY-MIXED PAINT			ROOFING SUPPLIES Carload lots f.o.b. factory				
	Per 100 lb. in 600-lb. (Approx.) bbl. Dry *a*	Per 100 lb. in oil	Per gal., drums Graphite *b*	Aluminum *c*	Ferric Oxide *d*	Rolls, slate surfaced, 85-90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 350 lb. bbl. per ton
Atlanta	$9.50	$13.625	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	9.25	13.25	1.95	2.90	2.50	2.60	3.25	3.25	.70	2.50*m*
Birmingham	9.50	13.625	2.35	2.75	1.85	1.98	1.57	1.57	.32	27.00
Boston	9.25	13.25	2.00‡	2.50‡	1.80‡	2.06‡	1.95*h*‡	1.95*h*‡	.50‡	20.00‡
Chicago	9.25	13.25	2.11	2.63	1.72	1.45*h*f	1.50*h*f	1.50*h*f	.26*f*	22.00*f*
Cincinnati	9.25	13.25	1.65	2.85	1.55	2.40	2.39*h*	2.39*h*	.36	21.00
Cleveland	9.25	13.25	2.50	3.10	1.90	1.84	1.58*h*	1.58*h*	.38	21.00
Dallas	9.25	14.00	1.88	2.11*n*	....	2.50*h*	2.60*h*	2.70*h*	.50	34.00
Denver	9.75	13.75	1.65	2.60	.27*l*	2.45	4.00	3.00	.35	28.00
Detroit	9.25	13.25	1.75	3.00	1.25	2.40	2.50	2.50	.35	26.00
Kansas City	9.25	13.275	2.30*g*	2.55*g*	1.82*g*	1.93	2.09	2.09	.25	25.00
Los Angeles	9.50	13.75	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	9.25	13.375	....	....	....	1.84*i*	1.58*h*i	1.58*h*i	.29	21.00
Montreal *p*	9.25	9.00	2.40	2.97	2.51	2.64	1.85	1.86	.63	1.85*k*
New York	9.25	13.25	2.03	2.55	1.64	1.92	1.66*h*	1.66*h*	.23	24.00
Philadelphia	9.25	13.25	....	....	....	2.27*e*	1.94*h*e	1.94*h*e	.41*e*	22.00
Pittsburgh	9.25	13.25	1.05	1.95	.80	1.95	1.94*h*	1.94*h*	.34	26.00
St. Louis	9.25	13.25	1.90/2.00	2.60/2.80	1.60/2.00	1.65	1.58	1.58	.28	21.00
San Francisco	9.50	13.50	1.80	2.75*n*	1.10/2.00	1.65	2.26	2.26	.28	17.00
Seattle	9.50	13.75	1.80	2.60	....	1.67	1.18*h*	1.75	.35	28.00*j*

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil *a* Red lead prices change frequently due to pig lead price changes. *b* U. S. War Dept. Spec. 3-49A. *c* ASTM Spec. D266-31. *d* 80% minimum ferric oxide. *e* Subject to 25% discount. *f* Distributors' price to contractors. *g* 5 gal. can. *h* Per roll, 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per 100 lb. *l* Per lb. *m* Per bbl. *n* May price, no later quotation available. *p* Plus 8% sales tax.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Common Labor Heavy Const.
Atlanta	$1.375	$1.00	$1.375	$1.00/1.25	$1.25	$0.40	$0.50
Baltimore	1.50	1.25	1.65	1.50	1.375	.625	.625
Birmingham	1.25/1.50	1.00/1.125	1.50	1.00/1.25	1.25	.40	.40
Boston	1.50	1.25	1.50	1.625	1.625	.85	.85
Chicago	1.70	1.625	1.70	1.70	1.70	1.025	1.025
Cincinnati	1.625	1.45	1.55	1.325/1.525	1.625	.75	.75
Cleveland	1.75	1.50	1.75	1.75	1.75	1.00	1.00
Dallas	1.50	1.00	1.25	1.00	1.50	.50/.625	50/.625
Denver	1.65*b*	1.43*b*	1.43*b*	1.43*b*	1.50*b*	.718*b*	.718*b*
Detroit	1.60	1.40	1.75	1.625	1.675	.80	.80
Kansas City	1.625	1.375	1.50	1.50	1.575	.85	.50
Los Angeles	1.375	1.10	1.375	1.375	1.50	.655	.655
Minneapolis	1.50	1.25*d*	1.50	1.40	1.50*e*	.90	.90
New Orleans	1.50	1.25	1.50	1.375	1.375	.55	.55
New York	2.00*b*	1.85*b*	2.00	2.00*b*	2.00*c*	1.031	.95
Philadelphia	1.65*b*	1.40	1.65	1.50	1.75	.70	.70
Pittsburgh	1.90	1.50	1.75	1.25	1.75	.80	.70
St. Louis	1.25/1.50	1.00/1.50	1.75	1.50/2.00	1.25/1.75	.675/.875	.875
San Francisco	1.75*c*	1.25	1.60	1.50	1.667*c*	.85/.875	.85/.875
Seattle	1.65	1.35	1.55	1.50	1.65	.95	1.00
Montreal	.80	.70	.75	.65	.80	.50	.44



b 7 hr. day. *c* 6 hr. day *d* 35 hr. wk. *e* 30 hr. wk.

ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) $1.501
ENR Common Average: $0.753

A NATURAL PRODUCT
makes concrete floors Stronger—Non-slipping

CORTLAND EMERY AGGREGATE

A real wearing Surface—not a "coating"

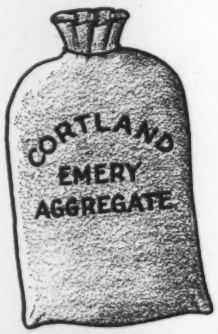
• CONCRETE WEARS YEARS LONGER

NOW—at last—after long research, there has been developed a method of making concrete surfaces so hard, so resistant to wear, smoothness, impact and moisture, that it may be said that a new era is opened! The answer is simply the incorporation of a natural product—CORTLAND EMERY—with cement and water in proper proportion and proper *surface thickness* for any service to which the finished concrete will be subjected. A Cortland EMERY Aggregate surface for floor, or platform, or stairway, is practically wearproof, non-slipping, everlasting. The first cost is the final cost.

• Cortland EMERY Aggregate Adds Years of Wear to Concrete for:

STATION PLATFORMS	SAFETY PLATFORMS	SIDEWALKS
LOADING PLATFORMS	STAIR TREADS	SHIPPING PLATFORMS
STAIRWAYS	BRIDGE LANES	RAMPS

—in fact, wherever concrete must take heavy wear and not wear smooth—wherever cement must do the toughest job!



• CORTLAND EMERY Aggregate Surfaces for Floors or Platforms are not new nor untried. These deep floor surfaces have *proved superior* in actual service in factories, garages—*real* surfaces from 3/8" to thickness desired—not a mere veneer or "dusting". Wear longer—will not dust—will not absorb dust, oil moisture—stay non-slipping—can be scraped, scrubbed, cleaned without damage. Far more economical in initial cost than either tile or iron plates or grids. Labor cost is no more than that needed for any other type of concrete floor.

NEW BULLETIN — READY NOW!

DISTRIBUTORS WANTED!

FILL A NATIONAL DEMAND!

Wherever concrete is laid to resist impact, abrasion, wear and tear, water and oil, there is an opportunity for DISTRIBUTORS to handle and SELL the proven superiority of Cortland EMERY Aggregate. Write or wire now for details of our distribution plan—get in on this remarkable opportunity today.

NEW—GET YOUR COPY

• Completely decriptive Bulletin on Cortland EMERY Aggregate gives complete data on densities, face depths, strength, safety, cleanliness, etc., etc.—all the facts wanted.

Engineers, Contractors and Engineering Architects will be vitally interested—send for a copy of the Cortland Emery Aggregate Bulletin today.

Name .....

Company .....

Address .....

WALTER MAGUIRE CO. INC., 330 West 42nd St., New York

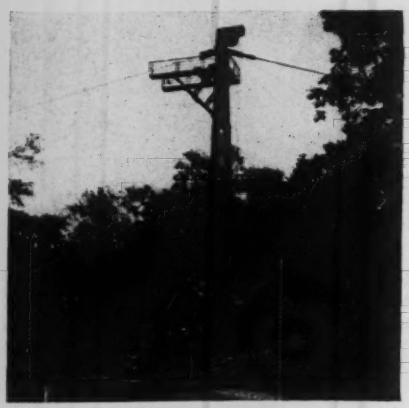
DAMS

of the smaller sizes use Steam Operated

LIDGERWOOD CABLEWAYS

Where Electric Current is not available as for instance,

This one:



1225 FT. SPAN

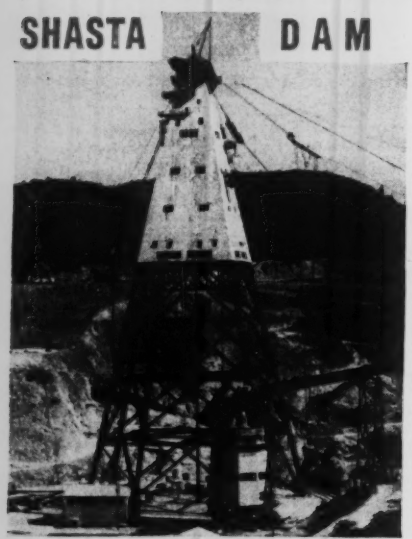
Handling 4 cu. yd. Buckets

But we build many

BIG ONES

Like this battery of SEVEN

SHASTA DAM



EST. 1873

LIDGERWOOD MANUFACTURING COMPANY
ELIZABETH·N·J·

MEN AND JOBS

Edwin H. Stahl, junior engineer in the Vicksburg, Miss. U. S. Engineer district from 1935 to 1939 and more recently assistant engineer in the Los Angeles district office, has accepted a position as structural designer with Donald R. Warren, who is the consulting structural engineer on the nine-million dollar magnesium plant being constructed by the Todd-California Shipbuilding Corp. near San Jose, Calif.

Henry G. Schnorbrich, St. Paul, Minn., a former PWA and WPA engineer, has been appointed liaison officer for the Seventh Zone, construction division office of the quartermaster general at Omaha, Neb.

Elmer K. Timby has taken a year's leave of absence from his duties as associate professor of civil engineering at Princeton University and will be associated with Howard, Needles, Tammen & Bergendoff, consulting engineers, New York and Kansas City.

Harold H. Short, engineering draftsman in the bridge office of the Wyoming highway department, Cheyenne, for the past year, resigned his position July 14 to start duty as second lieutenant in the 51st Field Artillery of the U. S. Army at Ford Leonard Wood, Mo. Lt. Short received his B.S. in civil engineering from Colorado State College in 1941.

Noel Dixon is office engineer for H. F. McLean, Ltd. at Valleyfield, Que. He is a graduate from the Mansfield Technical College, England, 1934.

Nesbit Gray is now construction engineer with the Shawinigan Water and Power Co. at Three Rivers, Que. He is a graduate of the Dalziel Technical School, England.

R. F. M. Marshall is now designing engineer with the Foundation Company of Canada, Ltd., Montreal.

Charles H. Ellaby, senior civil engineer in St. Louis, Mo., took office June 10 as president of the St. Louis Board of Public Service. Since 1930 Mr. Ellaby has been engaged principally in executive administration of the canalization of the Upper Mississippi and Illinois rivers by the U. S. Engineer Department. Mr. Ellaby will succeed **Baxter L. Brown.**

Steuart Purcell, at one time chief engineer of Baltimore, has been appointed chairman of the Maryland Public Service Commission by Governor Herbert R. O'Conor. He succeeds **Ovington E. Weller,** whose term has expired. Mr. Purcell has been an associate member of the commission since 1927. A civil engineering graduate from Cornell in 1901, Mr. Purcell was associated with the municipal government of Baltimore and in 1910 became structural engineer in the bureau of buildings. After service as an officer in the Engineer Corps during the World War he was made division engineer of the highway department and chief engineer in 1923. He became a member of the public service commission on Sept 1, 1927, and has been reappointed each time his term expired.

A. L. Martin is now a draftsman in the Montreal general engineering department of the Aluminum Co. of Canada. He is a graduate in civil engineering from the University of Manitoba, 1934.

E. G. P. Lang is now resident engineer in Montreal East for the Department of National Defense for Air. He is a graduate from Croydon Polytechnic School, England, 1917. Previous to joining the department of national defense he had been working on various construction projects throughout Canada.

Charles P. Casey, former Illinois state director of public works and buildings, has been nominated by President Roosevelt to be WPA administrator in Illinois. Mr. Casey has been acting administrator since the death of Howard S. Drew.

Henry G. Kuitu, graduate of the University of Minnesota's architectural engineering school in 1933, has been appointed Minnesota field engineer for the Structural Clay Products Institute, succeeding **M. H. Allen,** who has returned to Ames, Iowa, as regional director of the institute.

Maj.-Gen. Dan I. Sultan, formerly in command of the Hawaiian Division, Schofield Barracks, T.H., returned to the United States in April, and is now in command of the 38th Division (National Guard) at Camp Shelby, Miss.

Earle C. Hutchinson, former city engineer of Salida, is now working for WPA as office engineer at Pueblo, Colo.

G. A. Fleming, engineer, Bureau of Reclamation, returned to the Denver office early in May after having spent five months in Puerto Rico where he had been engaged in an investigation of the operation of irrigation works and

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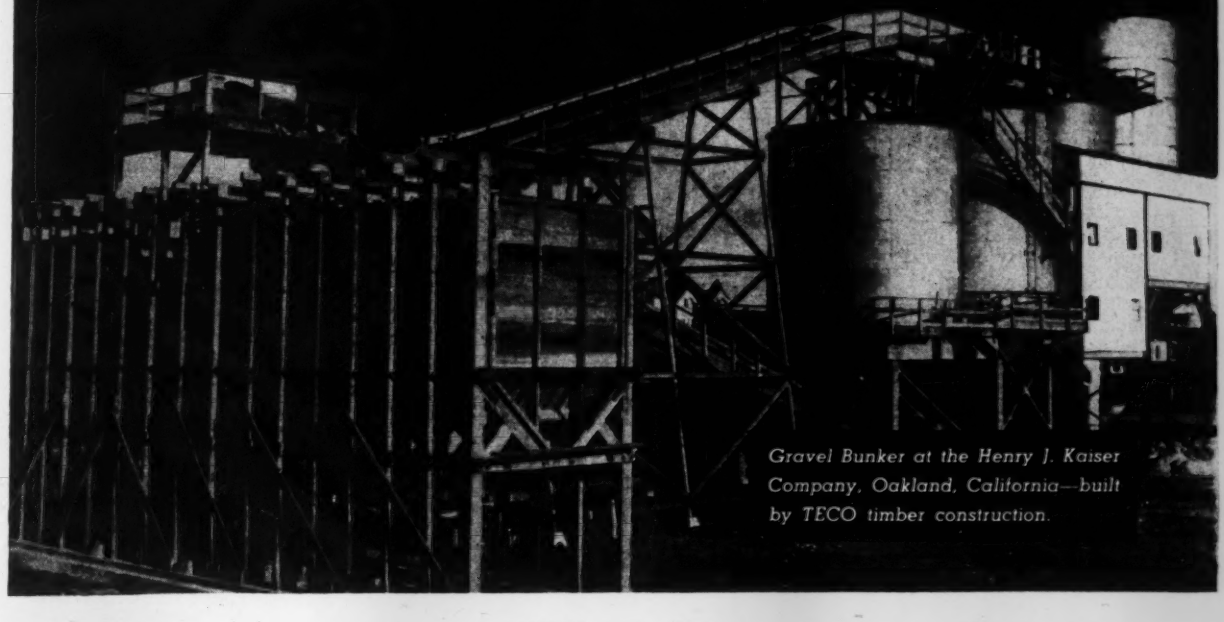
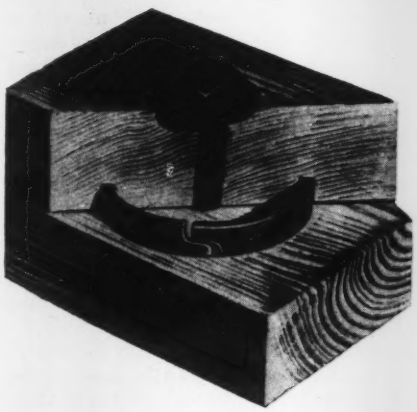


Gravel Bunker at the Henry J. Kaiser Company, Oakland, California—built by TECO timber construction.



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hydroelectric developments for the island government. His inclusion on the investigation board was brought about by an arrangement between the Puerto Rican government and the U. S. Department of the Interior.

Donald M. Williams, district engineer for the Asphalt Institute at Dallas, Tex., will become consulting engineer for Talco Asphalt & Engineering Co., Mount Pleasant and Dallas, Tex.

Charles Lynch, of St. John, N. B., has returned to the civil engineering profession and is doing government work in the maritime provinces.

G. G. Murdoch, of St. Johns, N. B., a veteran consulting engineer specializing in service for municipalities without resident engineers, has been appointed engineer in charge of a new sewer construction plan for the parish of Simonds, adjoining St. Johns.

Russell Bagley, former WPA county superintendent for Platte County (Wyo.), has been appointed as acting director of operations to replace **Fulton D. Bellamy,** now on leave to accept a job with Walter Flora, Cheyenne engineer and contractor.

James G. Wallace, city manager at Bangor, Me., since 1932, has accepted a position as city manager of Wilmington, N. C., and will begin his new duties Aug. 4. An engineering graduate of the University of Maine, Mr. Wallace will be the first city manager in Wilmington's history.

Richard M. Merriman, of Los Angeles, is available as a consultant on heavy engineering construction, with offices in 819 Petroleum Building, 714 West Olympic Blvd.

Stanley Freiberg, of Cincinnati, a lieutenant in the Engineer Reserve Corps, sailed from New York July 23 for Kingston, Jamaica, to begin active duty at the U. S. Engineer Corps office.

Earl Cannon has been promoted from junior engineer to assistant engineer at the Estes Park headquarters of the Colorado-Big Thompson project.

Antonio Morissette is now district engineer for the Eastern Townships with residence at Sherbrooke, Que., for the Quebec Department of Roads. He graduated in civil engineering from the Ecole Polytechnique of Montreal in 1926.

E. E. Price, director of the North Carolina State Unemployment Division and secretary of the North Carolina State

Unemployment Compensation Commission, has resigned to become executive secretary of the North Carolina Industrial Commission, effective Aug. 1. For 20 years Mr. Price was engineer, office manager and superintendent of construction for the Hardaway Construction Company of Columbus, Ga.

Leslie Berenstein is now vice-president of Louis Pickard & Co., Inc. Montreal, Que. He graduated in civil engineering from McGill University in 1930.

Kurt Hueftle, who graduated in June from the Iowa State College at Ames, Iowa, has left for Coco Solo, Panama Canal Zone, where he is to be employed as structural engineer on defense projects.

James L. Hales, of Raleigh, N. C., has been appointed North Carolina Administrator of the new federal agency, the Public Works Reserve, which has been set up to plan public works projects that may be undertaken after defense activities are slackened. A native of Guilford County, Mr. Hales is a graduate of the Drexel Institute of Engineering and for the past five years has been connected with the WPA in North Carolina.

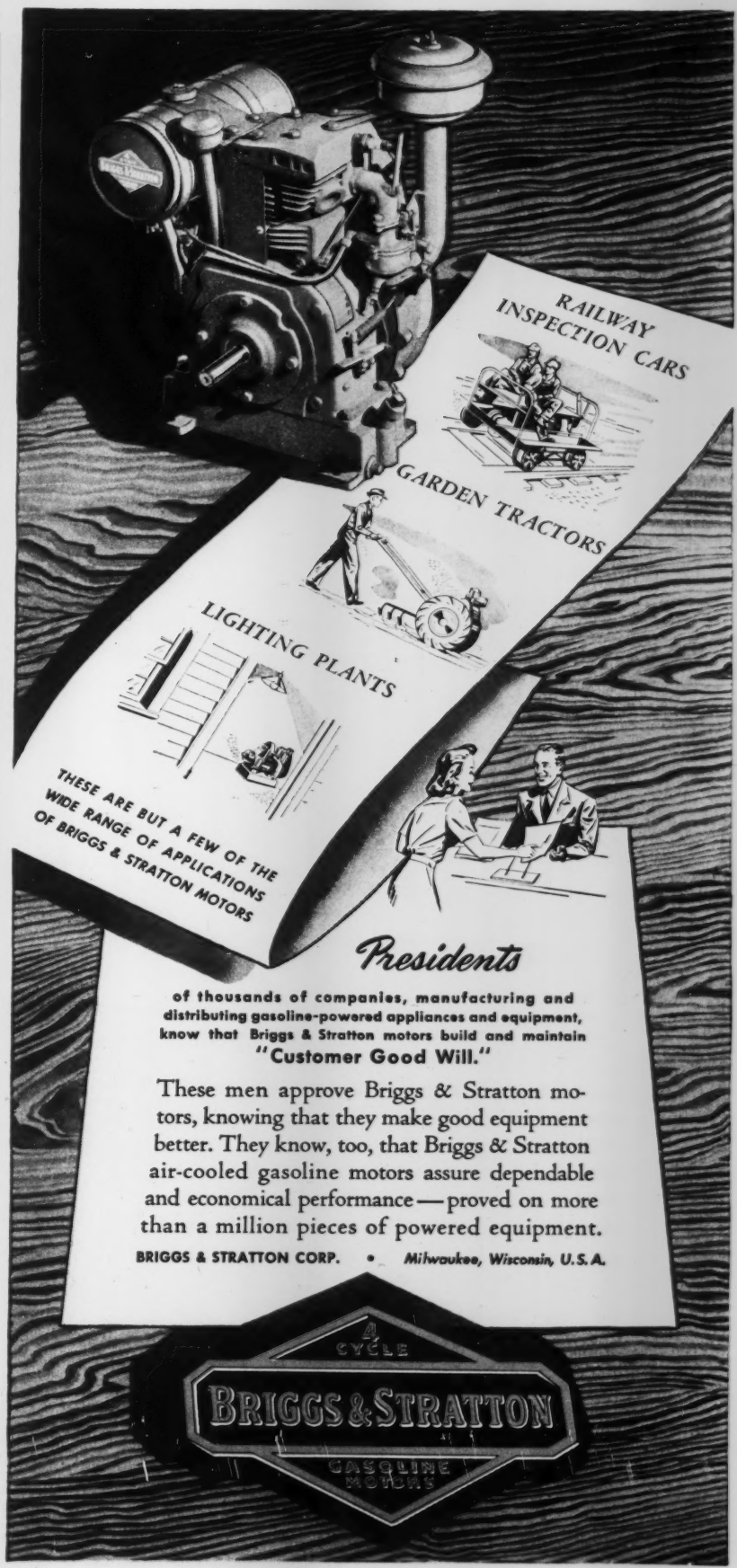
A. St-C. Riley is now vice-president and district manager for the Truscon Steel Co. of Montreal. He graduated in civil engineering, McGill University in 1910.

John T. Tucker, executive secretary and chief engineer of the North Dakota Water Conservation Commission, has been named alternate representative of that state on the Missouri Valley Regional Planning Commission. He will serve as alternate to Dean H. L. Walster, of the North Dakota Agricultural college. Appointments were made by Governor John Moses, of North Dakota.

W. W. Bell, district engineer of the British Columbia Dept. of Public Works, has been appointed as assistant chief engineer of the department. Mr. Bell succeeds the retired **George P. Napier,** who was also deputy minister of railways.

F. K. Preston, Mason City, Iowa, who has been assistant district engineer for the Iowa Highway Commission for many years, has resigned to accept a defense construction position.

D. S. Abell, for nine years principal assistant engineer in the division of sanitary engineering of the North Carolina State Board of Health, has accepted an appointment as director of the division of sanitary engineering of the state of Alabama and already has begun his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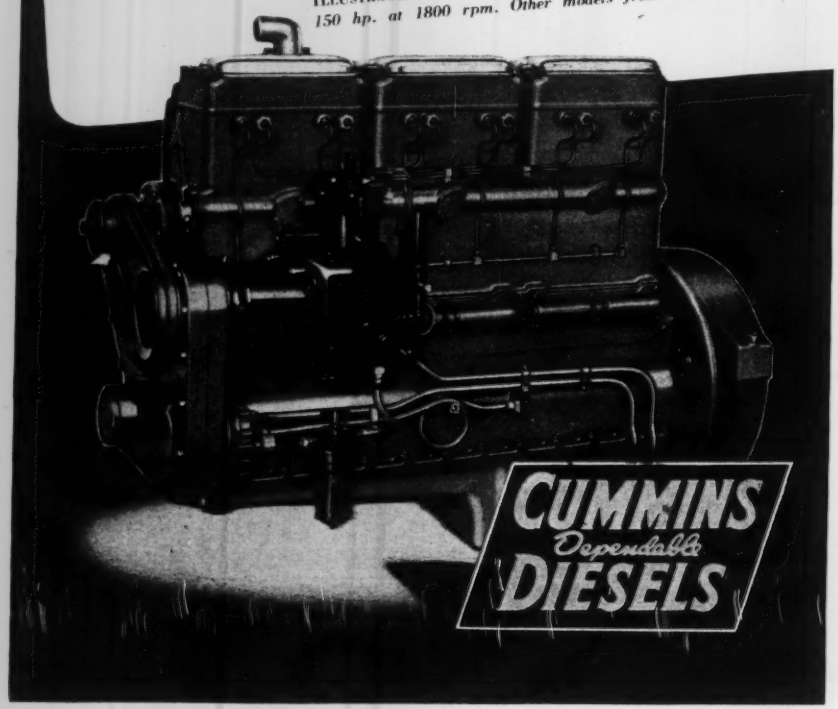

new duties. A native of Mich[illegible] Mr. Abell was formerly with the Ohio State Board of Health. He also taught at Denison University, Granville, Ohio. His successor in North Carol[illegible] has not been named.

Col. John W. Wheeler, former chairman of the Indiana State Highway Commission, is serving as commander of the 113th Engineers Combat Regiment 38th Division at Camp Shelby, Miss.

E. U. Stevenson, engineer with Bureau of Public Roads, Jackson Miss., office, has been transferred to the state office, Public Roads Administration, at Montgomery, Ala.

Charles P. Williams has been appointed by San Diego as resident engineer on the San Vicente Dam which that city is planning to construct immediately for water storage purposes.

Fred W. Ambrose, superintendent of buildings and grounds at the University of Arizona, has resigned to accept a similar position at Iowa State University. He will be succeeded by **C. B. Jensen,** Laramie, Wyo., architect.

Robert M. Mains, formerly instructor at the Missouri School of Mines, has been appointed engineer of tests at the Fritz Engineering Laboratory of Lehigh University. He will take up his duties on September 1st and succeeds **Howard J. Godfrey,** who has returned to John A. Roebling Sons Co. in their research and development department. **Dr. Bruce Johnston,** previously assistant director of the Fritz Laboratory, has been named associate director and associate professor of civil engineering.

F. K. Preston, assistant district engineer of the Iowa highway commission at Mason City, Iowa, has resigned. He is being succeeded by **G. H. Doty,** resident engineer of the commission at Charles City, Iowa. Mr. Preston has been with the commission 22 years, and Mr. Doty, 14 years.

Walter G. Stephan, a civil engineering graduate of Iowa State college in 1940, has become a junior engineer with the U. S. Geological Survey at Rolla, Mo.

S. J. Bird has been appointed vice-president of the McNamara Construction Co., Ltd., Leaside (Toronto), Ontario.

Erling Z. Cornell, civil engineer with International Harvester Co. of Tulsa, Okla., has accepted a civil service appointment as resident engineer in charge of the $18,000,000 bomber assembly plant at Tulsa. Mr. Cornell graduated from South Dakota State University in

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1930 and was a highway inspector for the South Dakota State Highway Commission for several years.

T. S. Simpson, Jr., who has been a draftsman with the city engineering department at Charlotte, N. C., for 13 years, resigned Aug. 1 to accept a position with Boyd and Goforth, Charlotte contractors.

Dean S. S. Steinberg of the College of Engineering at the University of Maryland has recently been appointed by Governor Herbert R. O'Conor for a term of six years as member of the Maryland Traffic Safety Commission, provision for which was made at the last meeting of the Maryland Legislature. He has been named chairman of the engineering committee of the commission.

Col. J. P. Mackenzie of Vancouver, B. C., has been given the rank of colonel and appointed director of works for the Canadian forces in Britain, with headquarters in London. Col. Mackenzie went overseas with the Second Division as a lieutenant-colonel in charge of engineers. Previously he was manager of Hamilton Bridge Western Ltd. at Vancouver.

Robert H. Dodds, formerly an editorial assistant on *Engineering News-Record,* is now a junior engineer in the U. S. Engineer Office at Wright Field, Dayton, Ohio.

Brig. Gen. James A. Anderson, head of the department of civil engineering and dean of Virginia Military Institute, has been appointed state highway commissioner of Virginia. Gen. Anderson has been with V.M.I. since 1919 except for the years 1933-36, when he directed PWA in Virginia, supervising a 30-million dollar building program. He was loaned to the state last December as coordinator for the State Defense Council.

Lt. Comdr. E. W. C. Nice, architect and engineer, has been transferred from Miami, Fla., where he was in charge of building the naval air station, to New Bern, N. C., where he will be resident officer in charge of construction at the new Marine Air Corps base on the Neuse River at Cherry Point.

Hugh S. Robertson, executive manager of Rockefeller Center, has been named by Mayor La Guardia as a member of the New York City Housing Authority to succeed **Edward F. McGrady,** resigned. Mr. Robertson's many years of construction experience include work with the New York Central R. R., and founding of the firm of Todd, Robert-

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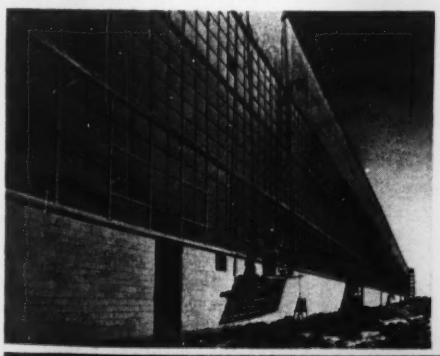

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George M. Haley, Salt Lake county surveyor since 1935, has been granted a leave of absence by the county commission to become an engineer on the small arms ammunition plant being constructed by Smith, Hinchman & Grylls, Inc., engineers.

Senator Ed H. Watson, Salt Lake City, has been appointed as Utah state engineer to succeed **T. H. Humpherys,** resigned. The new state engineer is a petroleum geologist by profession and has given much study to groundwater problems. Mr. Humpherys has accepted a position as Utah state director of the Public Works Reserve, an organization set up by President Roosevelt to plan projects to take up the slack after the defense boom.

Thomas H. Green, who has been an engineer with the division of operations of the Virginia State WPA, has been appointed director of the Public Works Reserve and will have headquarters in Richmond. He is one of thirty-two state directors whose appointments were announced in Washington, as of Aug. 1.

B. S. Corbett has joined the R.C.A.F. and is at present attending the Aeronautical Engineering School at Montreal. He graduated in civil engineering from the University of Alberta in 1936. Before enlisting he was with the engineering staff of the International Nickel Co., at Copper Cliff, Ont.

Guillaume Piette is now soil engineer with the highway department at Quebec. He graduated in civil engineering from the Ecole Polytechnique of Montreal in 1939.

William B. Hill, associate highway engineer for the Indian service in Oklahoma, was appointed by Secretary Ickes to be superintendent of the Seminole Indian agency at Dinia, Fla., succeeding **Dwight Gardin.** Mr. Hill holds a civil engineer's degree from the University of Maryland.

Clair F. Bowman, chief engineer of the Montana Public Service Commission, has been appointed assistant chief engineer of the Maryland Public Service Commission and took up his duties as of Aug. 1. He fills a vacancy created by the resignation in April of **Charles Thornton,** who is now connected with the engineering firm of Stone & Webster, Boston. Mr. Bowman is a native of Waverly, Neb., and his engineering experience includes teaching at the universities of Nebraska and Purdue and

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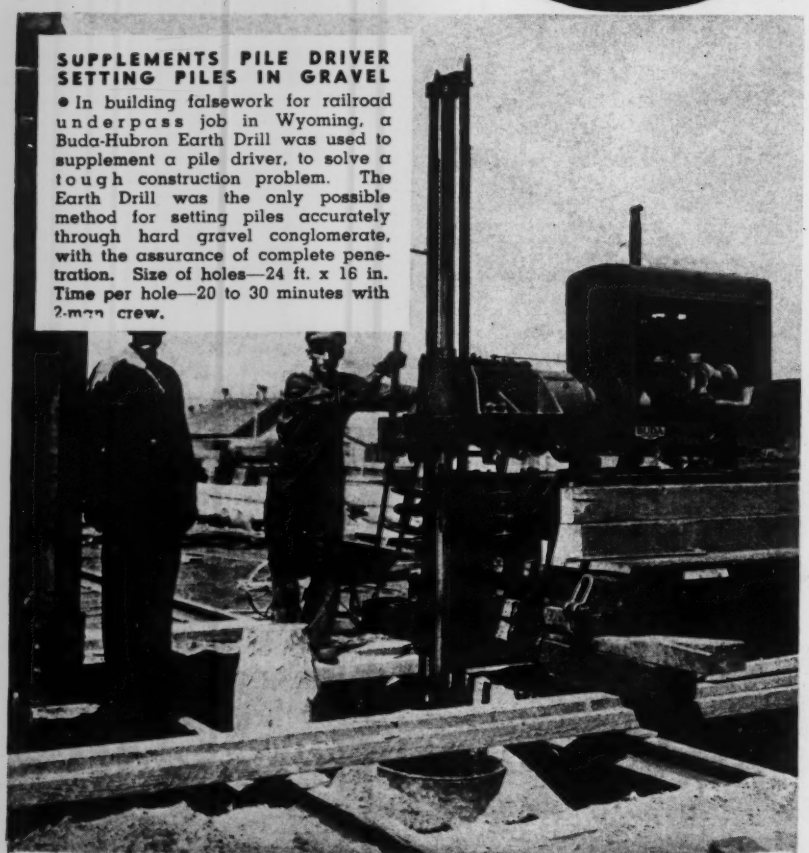

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Montana State College, and a period as chief engineer of the Montana Railroad & Public Service Commission. He has been with the Montana Commission as chief engineer since 1939.

O. W. Swanson, of St. Paul, president of the Associated General Contractors of Minnesota, has gone to Newfoundland to take over certain phases of construction work on the Newfoundland air base which will necessitate his absence for four or five months. **W. M. Cederstrand,** Minneapolis, first vice president of the association, has been made acting president in Mr. Swanson's absence.

Maj. Carl H. Breitwieser, engineer officer serving temporarily with the Quartermaster Corps, has been ordered to Memphis as constructing quartermaster of the new quartermaster depot to be established there. Maj. Breitwieser has been constructing quartermaster at Camp Forrest, Tenn., and will be succeeded by **Capt. Robert C. Brown,** his assistant there.

Edward B. Snell, civilian engineer, has been placed in charge of U. S. Army Engineers in the Albany area succeeding **W. W. Wegener,** acting chief since the transfer of **Col. Clifton W. Ball** to Block Island several months ago. This appointment comes after 34 years in federal service. After being on the engineering staff of the New York, New Haven & Hartford R. R. and then the Missouri Pacific R. R., Mr. Snell began to work for the government at New London, Conn. He was transferred to the New York area of the U. S. Army Engineers in 1916, where he had remained until moving to Albany recently.

Warren A. Ford, a prominent engineer of Eagle Rock, Calif., sailed July 17 for Honolulu, Hawaii, where he is to act as engineer for the W. E. Callahan Construction Co. on a national defense project.

W. T. Cox, resident engineer at Asheboro, N. C., for the past two years for **William Piatt,** Durham, N. C., consulting engineer, has just been named city engineer at Asheboro and began his new duties on Aug. 1. **Capt. R. E. Shepard,** former assistant constructing quartermaster at Fort Blanding, Fla., has been transferred to Durham, N. C., as construction quartermaster in charge of the proposed $22.800.000 U. S. Army camp near Durham. Mr. Piatt's firm, of Durham, and the **W. S. Lee Engineering Corp.** of Charlotte, N. C., have been awarded a joint contract for architect and engineering service. Mr. Piatt will serve as general manager of the project and his assistant, **P. D. Davis,** will be in charge of designing. **J. A.**

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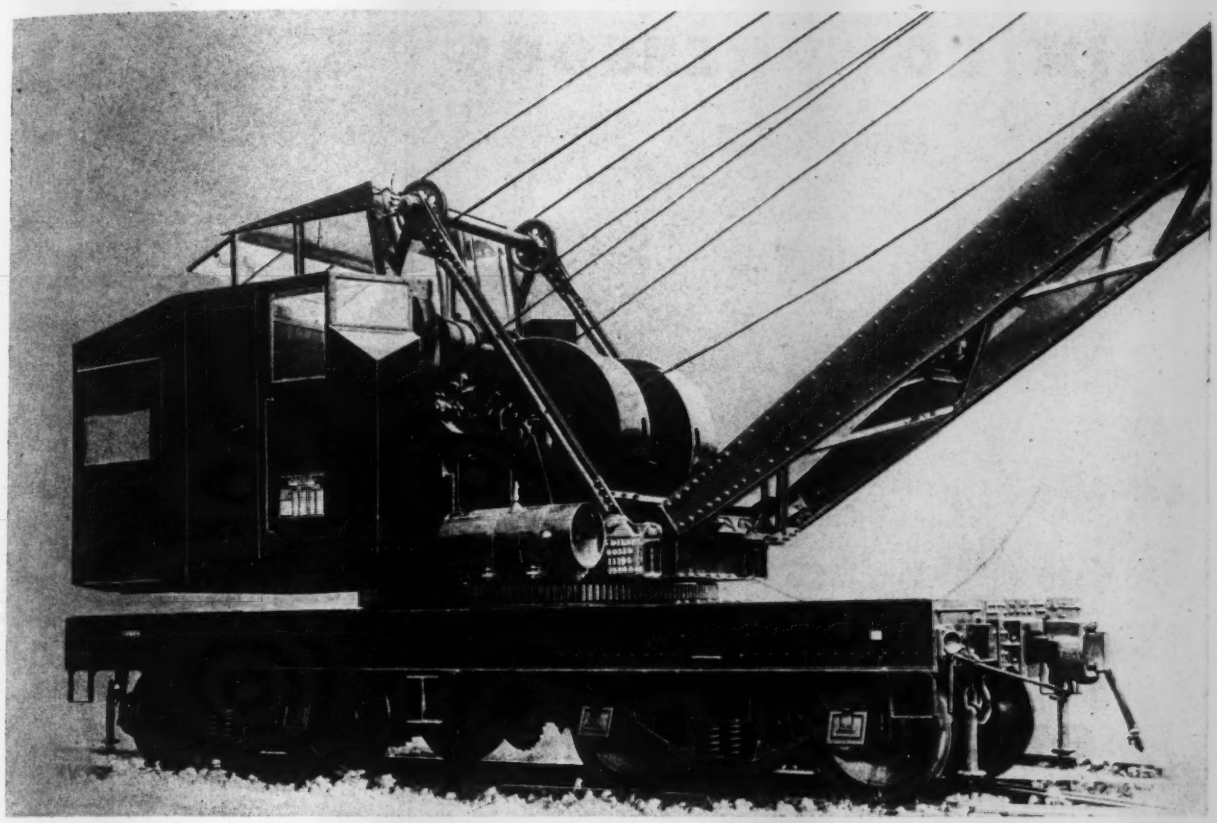

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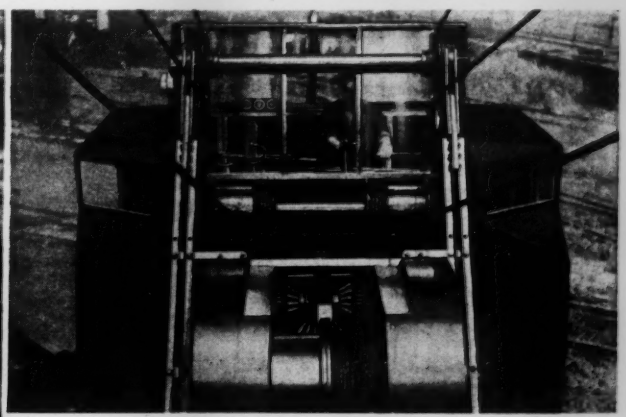

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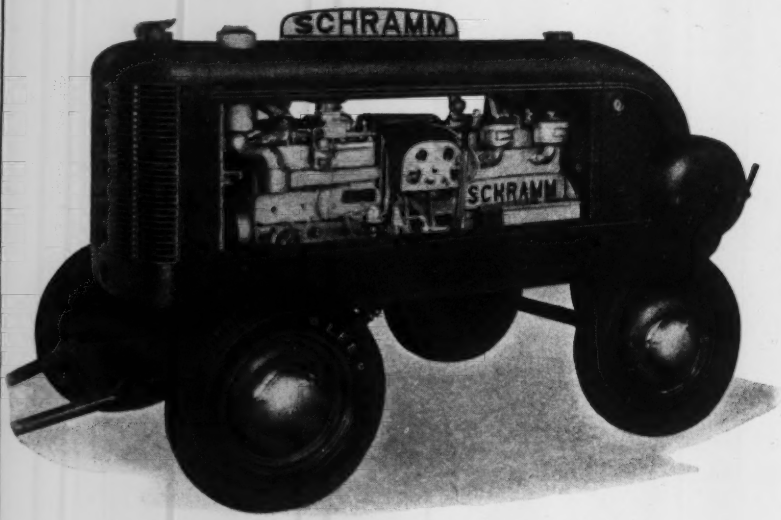

SCHRAMM Model 105 Compressor on Pneumatic Tires

QUICK STARTING
EASY HANDLING

Two FEATURES that save time and money combined in SCHRAMM Portable Air Compressors.....

ELECTRIC SELF-STARTING....push the button, just like your automobile. Instant air. No dangerous cranking, no stalling. Fast, safe starting with the SCHRAMM.

LIGHTWEIGHT.....less weight to move. Saves trucking expense. Reduces time in moving on the job. The greatest time and money saving feature ever introduced in "Portable" Compressors.

WRITE For illustrated Catalog Number 42-P

SCHRAMM, INC.
WEST CHESTER, PA.

Stewman, Jr., of the W. S. [illegible] Corp. has been sent to Durham as personnel director.

The following officers of the Civil Engineer Corps, U. S. Naval Reserve, have been called to active duty:

Ensign Robert E. Sparks, civil engineer, Sinclair Refining Co., Fort Worth, Tex., to active duty at the Naval Air Station, Corpus Christi, Tex.

Ensign Victor G. Stevens, instrumentman, Water Bureau, Met. District Commission, Barkhamsted, Conn., to active duty in the Bureau of Yards and Docks, Washington, D. C.

Comdr. Louis W. Bates, Chevy Chase, Md., to active duty in the Bureau of Yards and Docks, Washington, D. C.

Comdr. Horace D. Rouzer, Washington, D. C., to active duty in the Bureau of Yards and Docks, Washington, D. C.

Lt. Comdr. Gale H. Carrithers, Lincoln, Neb., to active duty at the U. S. Naval Ammunition Depot, Burns City, Ind.

Lt. Comdr. Andrew D. Lewis, Staten Island, N. Y., to active duty in the Bureau of Yards and Docks, Washington, D. C.

Lt. Comdr. Harry H. Schoen, Charleston, S. C., to active duty in the 6th Naval District, Charleston, S. C.

Lt. Comdr. George Stiles, Washington, D. C., to active duty in the Bureau of Yards and Docks, Washington, D. C.

Lt. Francis W. Alcock, Bay Shore, N. Y., to active duty in the 14th Naval District, Pearl Harbor, T. H.

Lt. Kenneth M. Clark, Minneapolis, Minn., to active duty at the Naval Station, Key West, Fla.

Lt. George C. Emery, Denver, Col., to active duty at the Naval Operating Base, Norfolk, Va.

Lt. Edward H. Feldmann, New Rochelle, N. Y., to active duty in the 10th Naval District, San Juan, Puerto Rico.

Lt. Kenneth W. Fenwick, Los Angeles, Calif., to active duty at Naval Operating Base, Norfolk, Va.

Lt. Ray R. Gentry, Huntington, W. Va., to active duty at the Naval Operating Base, Norfolk, Va.

Lt. Jack H. Gilbert, Jackson, Tenn., to active duty at the Navy Yard, Portsmouth, N. H.

Lt. Karl F. Lueder, to active duty in the Bureau of Yards and Docks, Washington, D. C.

Lt. Stanley B. Lyons, New York, N. Y., to active duty in the 10th Naval District, San Juan, Puerto Rico.

Lt. Frank McKenzie, Alameda, Calif., to active duty in the Bureau of Yards and Docks, Navy Dept., Washington, D. C.

Lt. Marion B. Orr, Indianapolis, Ind., to active duty at the Naval Air Station, Corpus Christi, Tex.

Duplicate Tracings QUICK

GUARANTEED TO PASS NAVY AND FEDERAL "SPECS."

Same Size — Larger or Smaller
Partial or Complete Duplication

Masterrepro is a sensitized water-proof tracing cloth. Using an original tracing, you will get a fresh duplicate equal but more durable than the hand made original drawing. You can erase it, you can add lines or numerals in India ink or pencil. Think of the possibilities in your own drafting when Masterrepro takes the place of hand redrawing for any of the following uses . . .

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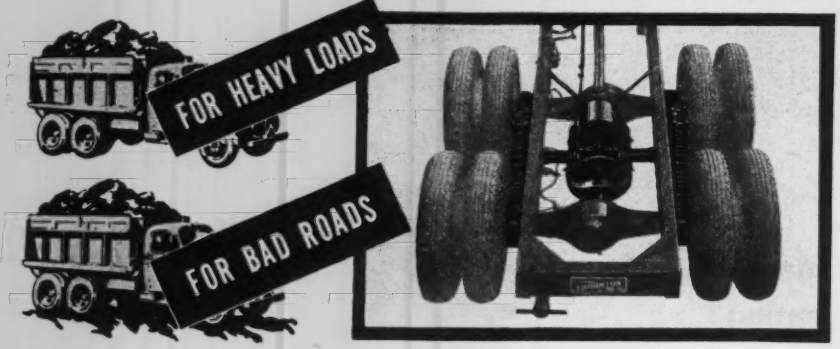
THORNTON 4-REAR-WHEEL DRIVE



In these days when *transportation* must sustain the heavy demands of defense and industrial programs, THORNTON Four-Rear-Wheel DRIVE is rendering a tremendous service in scores of industries. With its application to trucks up to 3-ton rating, it supplies double the tractive effort and more than twice the payload capacity.

This unit is giving vital aid in solving defense transportation problems.

Engineered particularly to meet YOUR requirements, your THORNTON-equipped trucks will carry their bigger loads faster, more economically and, if necessary, through tougher going. "Walking-Beam" dual suspension reduces shock on load and road.

Write today for details concerning the application of this unit to your own hauling problems.

THORNTON TANDEM CO.
8729-8779 GRINNELL AVE. DETROIT, MICH.
Manufacturers also of the THORNTON automatic-locking DIFFERENTIAL
"When you need TRACTION you need THORNTON"

MEETINGS

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Pacific Coast Convention, Canyon Hotel, Yellowstone Park, Wyo., Aug. 27–29, 1941.

PENNSYLVANIA SEWAGE WORKS ASSOCIATION, State College, Pa., Sept. 3-5.

AIRCRAFT STRUCTURES CONFERENCE, sponsored by Civil Engineering Division, Society for the Promotion of Engineering Education, New York University, New York, N. Y., Sept. 5-6.

PAN-AMERICAN HIGHWAY CONGRESS, fourth exposition, National Stadium, Mexico City, D. F., Sept. 15-24.

NATIONAL SAFETY CONGRESS AND EXPOSITION, National Safety Council headquarters, Chicago, Ill., Oct. 6–11, 1941.

FEDERATION OF SEWAGE WORKS ASSOCIATIONS, 2nd annual convention, Hotel Pennsylvania, New York, N. Y., Oct. 9–11, 1941.

AMERICAN PUBLIC HEALTH ASSOCIATION, Atlantic City, N. J., Oct. 13–17, 1941.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, annual convention, The Greenbrier, White Sulphur Springs, W. Va., Oct. 14–17, 1941.

AMERICAN SOCIETY OF CIVIL ENGINEERS, Fall meeting, Palmer House, Chicago, Ill. Oct. 15–17.

AMERICAN WELDING SOCIETY, Bellevue-Stratford Hotel, Philadelphia, Oct. 19–24, 1941.

AMERICAN PUBLIC WORKS ASSOCIATION, 47th annual conference, Roosevelt Hotel, New Orleans, La., Oct. 26–29, 1941.

NATIONAL COUNCIL STATE BOARDS OF ENGINEERING EXAMINERS, Hotel Pennsylvania, New York, N. Y., Oct. 27–30.

REGIONAL AND LOCAL MEETINGS

SOUTH DAKOTA STATE ASSOCIATION OF COUNTY COMMISSIONERS, HIGHWAY SUPERINTENDENTS AND AUDITORS, annual convention, Evans Hotel, Hot Springs, S. D., Sept. 8–10.

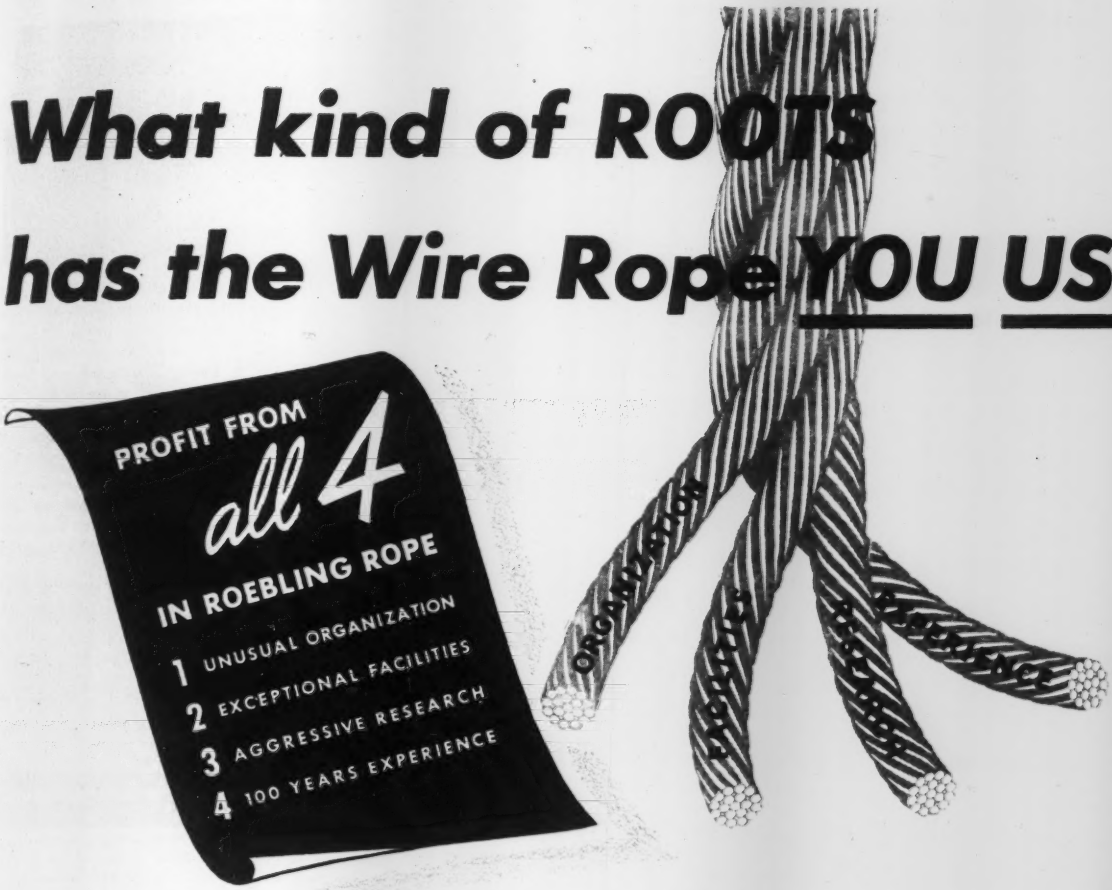
SOUTHEASTERN TRAFFIC ENGINEERING CONFERENCE, Clemson College, Clemson, S. C., Sept. 9–12.

NORTHERN MICHIGAN COUNTY ROAD COMMISSIONERS ASSOCIATION, annual meeting, Cheboygan, Mich., Sept. 18-19.

NEW YORK STATE ASSOCIATION OF TOWN HIGHWAY SUPERINTENDENTS, Rochester, N. Y., Sept. 18-20.

NEW ENGLAND WATER WORKS ASSOCIATION, Hotel Statler, Boston, Mass., week of Sept. 23-26.

What kind of ROOTS has the Wire Rope YOU USE?



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Profit from this unequalled combination of advantages. The use of Roebling "Blue Center" will assure you of rock-bottom *general average* rope operating cost.

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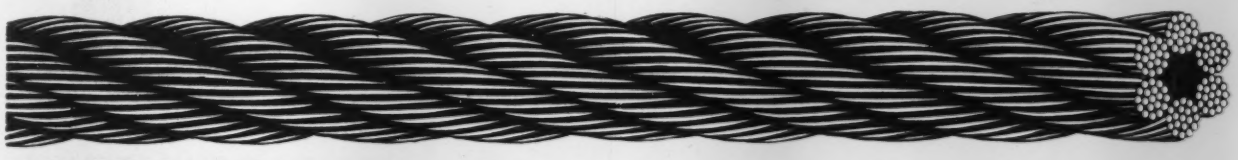

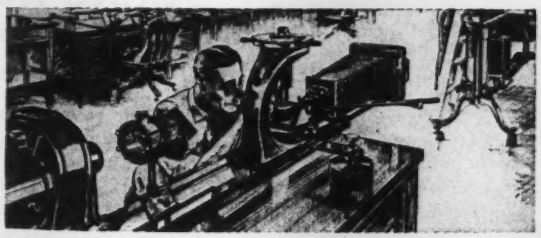

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There is nothing static about Roebling "Blue Center" Wire Rope. It is constantly being developed and improved. We keep it ahead—by looking ahead, with Research.

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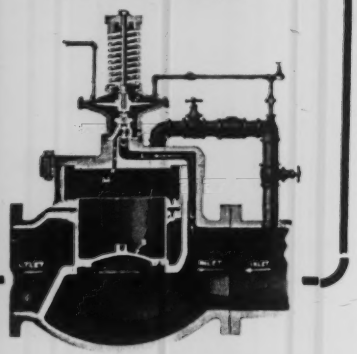

● It's sound business to make your purchasing dollar buy as much as possible . . . and in regard to valves, this means the specification of GOLDEN-ANDERSON automatic control valves for all steam and water applications.

Here is shown one example of the G-A line . . . a sterling quality altitude control valve, guaranteed to provide maintenance-free performance . . . to give you "more years of service per dollar expended."

A single or double acting unit that maintains water levels within 3 to 12 in. variation, this valve's differential control permits delayed opening for any depth tank . . . it also acts additionally as a check valve. Control may be arranged, through electric units, for remote operation. In cast iron, semi-steel or cast steel, 150 lbs. to 400 lbs., working pressure—globe pattern from 2" to 36".

This altitude control valve represents just one of the many types that G-A manufactures . . . get the complete GOLDEN-ANDERSON economy and performance story from our new Catalog No. 26. A letter will bring you your free copy by return mail.

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CANADIAN GOOD ROADS ASSOCIATION, 26th annual convention, General Brock Hotel, Niagara Falls, N. Y., Oct. 7–9, 1941.

AMERICAN WATER WORKS ASSOCIATION, Minnesota Section, 1941 convention, Minneapolis, Minn., Oct. 9–11, 1941.

AMERICAN WATER WORKS ASSOCIATION, New Jersey Section, fall meeting, Atlantic City, N. J., Oct. 16–18, 1941.

ILLINOIS WATER PLANT OPERATORS, 9th annual fall meeting, Leland Hotel, Springfield, Ill., Oct. 28–29.

WATER AND SEWAGE WORKS CONFERENCE, 7th annual meeting, Aberdeen, S. D., Oct. 28–29, 1941.

AMERICAN SOCIETY OF CIVIL ENGINEERS, Georgia Section, fall meeting, Atlanta, Ga., October.

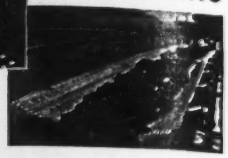
ELECTIONS AND ACTIVITIES

THE ANNUAL SUMMER CONVENTION of the North Carolina Society of Engineers was held at Wrightsville Beach, N. C., Aug. 1-2, in conjunction with a meeting of the North Carolina section of the American Society of Civil Engineers. This joint meeting marked the first time that the two groups had convened together. Nearly 250 delegates attended the convention.

Among the principal speakers were: Henry H. Armsby, field coordinator, engineering sciences and management of defense training, U. S. Office of Education, who spoke on "Engineering, Science and Management of the Defense Training Program"; Harry Tucker, of Raleigh, N. C., member of the North Carolina State Utilities Commission and Raleigh, N. C., Planning Commission, "Transportation and City Planning"; A. P. Rudder, assistant district manager of Wallace & Tiernan, Inc., of Greensboro, N. C., "Chlorination for Water Purification, Sewage Treatment and Improvement of Many Industrial Processes"; T. S. Johnson, of Raleigh, N. C., chief engineer, division of water resources and engineering, North Carolina state department of conservation and development, "Hydrology of the Floods of August, 1940"; and Dr. G. W Dyer, of Vanderbilt University, Nashville, Tenn., who spoke on the subject of "The Value of Engineers in the Defense Program."

Officers of the North Carolina Society of Engineers are: R. Getty Browning, of Raleigh, chief locating engineer for the North Carolina Highway and Public Works Commission, president; Channing B. Rown of Charlotte, N. C., vice-president; and Roy L. Williamson, commissioner of public works at Raleigh, secretary and treasurer. Harold C. Bird of Durham, N. C., is president of the North Carolina section of the American Society of Civil Engineers.

KEEP YOUR CONVEYOR BELTS GOING



FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. Their use saves expensive replacements and extended shutdowns.

● Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco belt fasteners. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco. Also illustrates step by step the latest practice in repairing rips and putting in patches.

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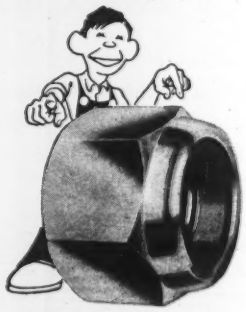
FLEXCO HD BELT FASTENERS

Sold by supply houses everywhere

For reducing
EQUIPMENT MAINTENANCE COSTS...



The SELF-LOCKING NUTS that can't be loosened by vibration or hard service

. . . specify them on new equipment and use them for replacement.

● Folder explaining the Elastic Stop principle is worth writing for.

ELASTIC STOP NUT CORPORATION
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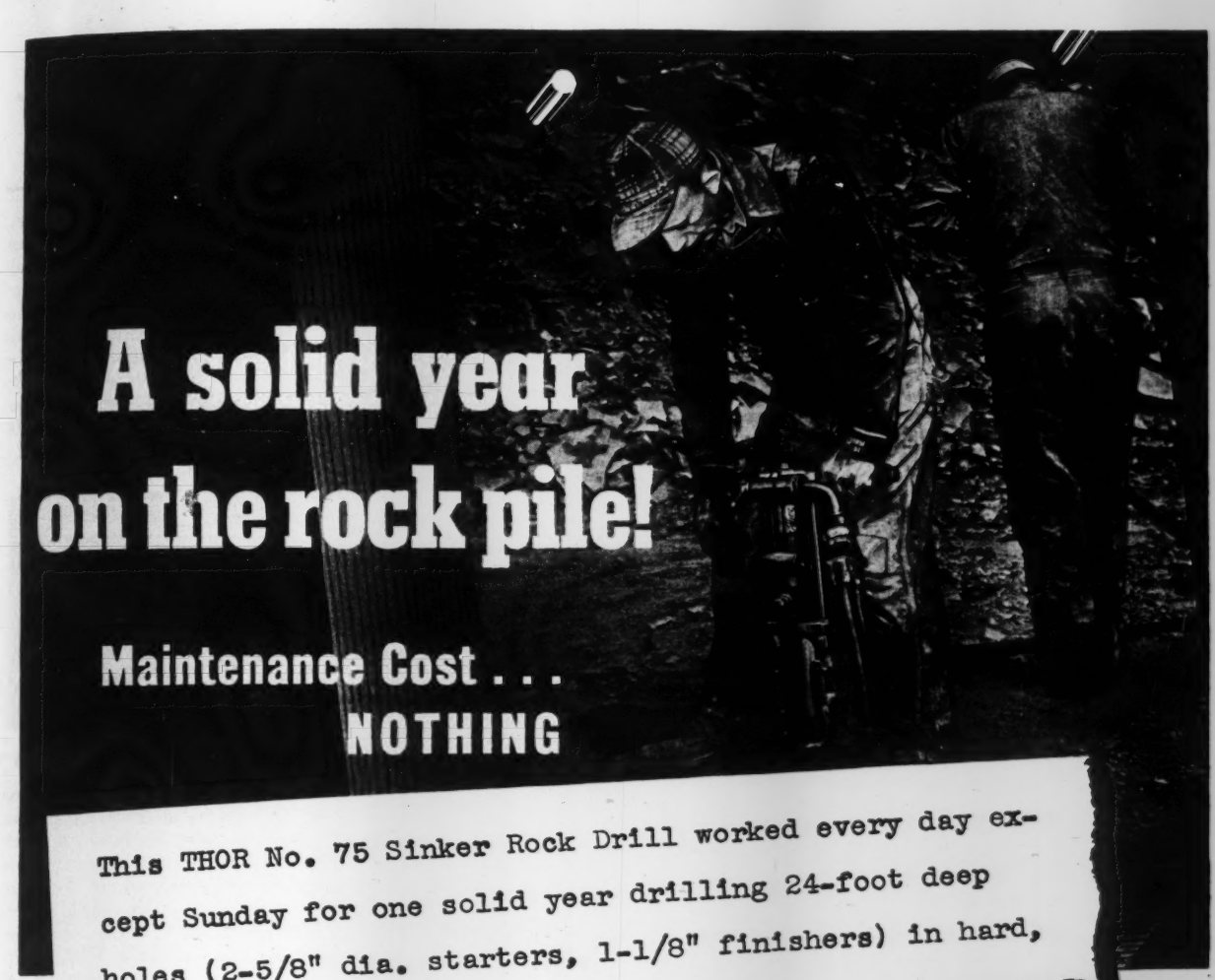
Elastic Stop SELF-LOCKING NUTS



A solid year on the rock pile!

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This THOR No. 75 Sinker Rock Drill worked every day except Sunday for one solid year drilling 24-foot deep holes (2-5/8" dia. starters, 1-1/8" finishers) in hard, abrasive sandstone with quartz seams.

No repairs were required in the entire period.

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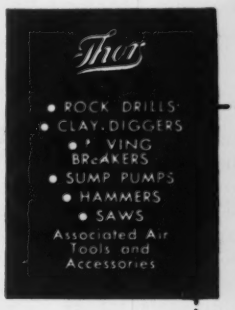

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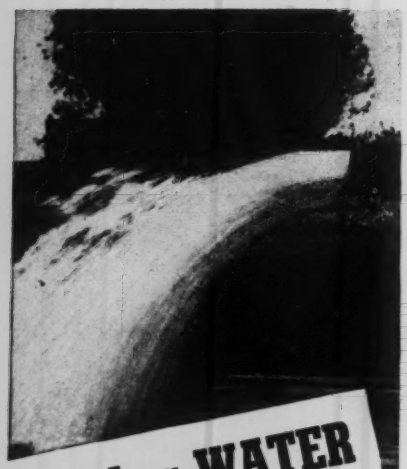
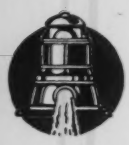


It Takes WATER TO WIN A WAR



FOR MEN, machines and materials there is no substitute for water. Every factory, city, air field, army camp or munition plant engaged in defense work should have an abundance of water—preferably from its own Well Water System. A water shortage or failure would play havoc with any production program.

In selecting a Well Water System you would first look to a firm that had a dependable reputation. It should have proven itself over a long period of time. Next, their product should be of unquestionable merit. All of these basic factors and many more are enjoyed by Layne—"The World's Largest Water Producers." The Nation-wide Layne organization has the men, equipment and skill to undertake and promptly complete any size water producing project, anywhere in the United States or possessions.

If you would like to have facts concerning your water supply needs, write to Layne. Their engineers are ready to cooperate. They are specialists in the water producing field. They know water bearing formations, well drilling and pump installation. For bulletins on Layne Well Water Supplies and Turbine Pumps, write

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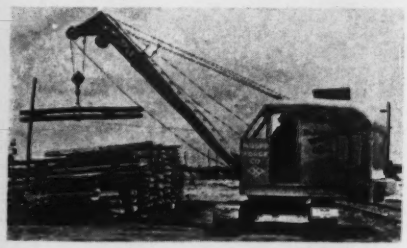
International Water Supply	London, Ontario, Can.

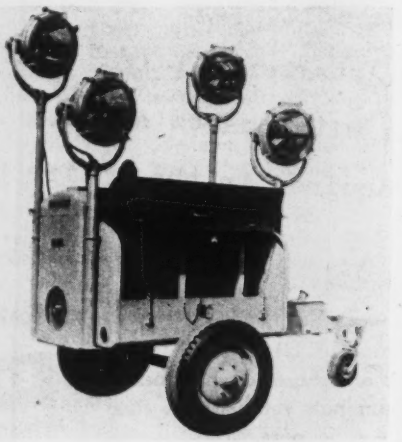
New Aids to the Constructor

Equipment and material announcements and manufacturers' news



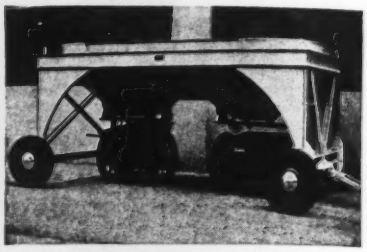
Gooseneck Boom Crane

A yard crane with a short gooseneck boom is now available which provides greater stability under heavy loads, facilitates car loading and unloading and working in close quarters. Other features of this outfit, the Buckeye Clipper Gooseneck Crane, include: 175 f.p.m. minimum hoist speed; welded steel box type boom; safety power drum brakes; quick convertibility to shovel, dragline or lifting magnet, and the machine will travel, swing and hoist, simultaneously. Three models are available Model 50, 5-ton; Model 60, 6½-ton, and Model 70, 7-ton capacity.—*The Buckeye Traction Ditcher Co., Findlay, Ohio.*



Portable Lighting Unit

"Nite-Hawk", a new handy, portable floodlight unit easily towed by an auto or small truck, and built to give light "where you want it—when you want it"—is now on the market. It is a self-contained source of light and fills the need where power lines are unavailable or where the connection and set-up would be too expensive. Four 1000 watt wide-angle floodlights, one on each corner, casts powerful beams in the same or different directions. Each light is individually operated from a control panel and is adjustable up and down and in all directions. In addition to providing light, the unit has a control panel with receptacles for operating small hand tools such as electric drills, saws and hammers. Power is supplied by an air-cooled 14 hp. LeRoi engine, equipped with an electric starter. A 5000-watt self-regulating d.c. generator, connected to the engine, delivers current at 110 to 120 volts.—*Lister-Blackstone, Inc., 1706 S. 68th St., Milwaukee, Wis.*

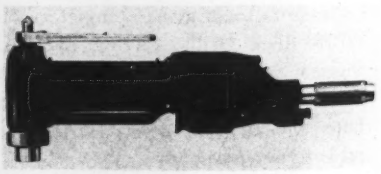


Low Hopper for Truck Mixers

This double gate, low head room hopper for high-dump truck mixers has four wheels, a new development which permits quick and easy transport, and is designed to accommodate the discharge from a 4 yd. high-dump truck mixer. An easily removable side section accommodates the dumping of a 3 yd. mixer. The all-welded steel bin is built to insure self cleaning. Double clamshell gates have a floor clearance of 36 in. for molding concrete part. — *Garlinghouse Bros., 2416 East 16th St., Los Angeles.*

Wrenches

A double offset Boxocket wrench has been developed which grips all six sides of the bolt head or nut. This wrench has several special uses as it cannot slip off the nut, the jaw cannot spread, it can be used where the bolt end protrudes a considerable distance through the nut, and is double broached for working in close corners.—*Snap-On Tools Corp., Kenosha, Wis.*

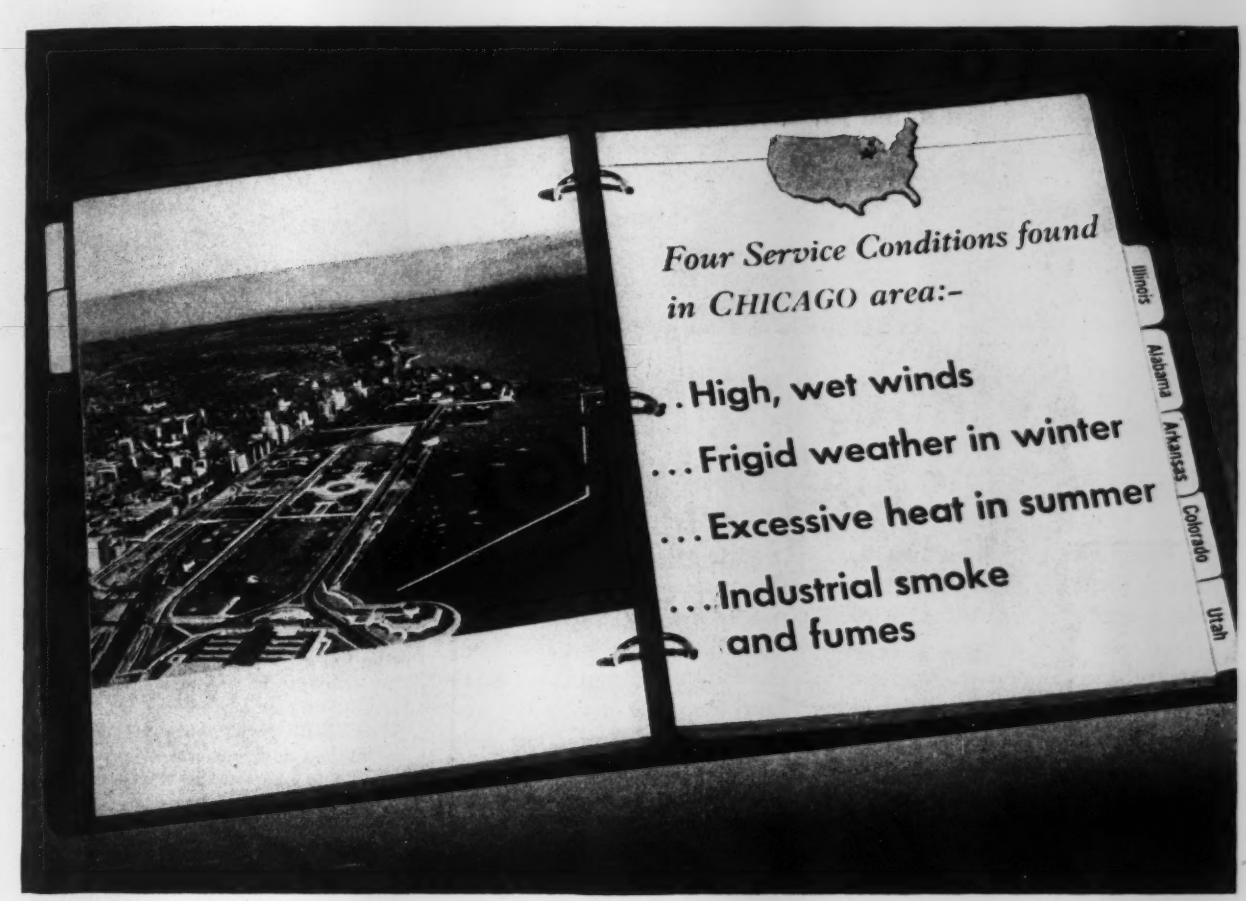


Close Corner Air Drills

Developed to cut the time required for heavy duty close quarter work, the Thor No. 377 class rotary pneumatic close

ANOTHER PAGE IN THE STORY OF "BAKELITE" RESIN COATINGS

and how they meet rigid government and industrial specifications the country over



THE CHICAGO AREA is exposed to high-velocity, moisture-soaked lake winds, as well as extremes in temperature that fluctuate from sub-zero weather to the excessive heat of summer. It is typical of other industrial areas where vastly expanded production, essential to National Defense, has created serious plant and structure maintenance problems. The combination of climatic conditions and acid fumes, sulphurous smoke, fly-ash and other deteriorating factors is taking its toll of surface coatings.

To provide maximum protection against such severe conditions, the Bakelite Laboratories are co-operating closely with leading paint and varnish manufacturers. Anti-corrosive primers and topcoats, *fortified* with BAKELITE Synthetic Resins, have been developed to meet the most rigid government and industrial specifications. As individual coating problems arise, Bakelite Research and Development activities are directed toward their solution.

Why not let the Bakelite Laboratories analyze your surface coating requirements? The experience of many years may provide a ready answer or it may aid you in building specifications to suit your special needs. Write for Booklet 11S, "BAKELITE Synthetic Resins," and Bulletin 17, "Specifications for BAKELITE Resin Finishes."

BAKELITE CORPORATION, 30 EAST 42ND ST., NEW YORK
Unit of Union Carbide and Carbon Corporation

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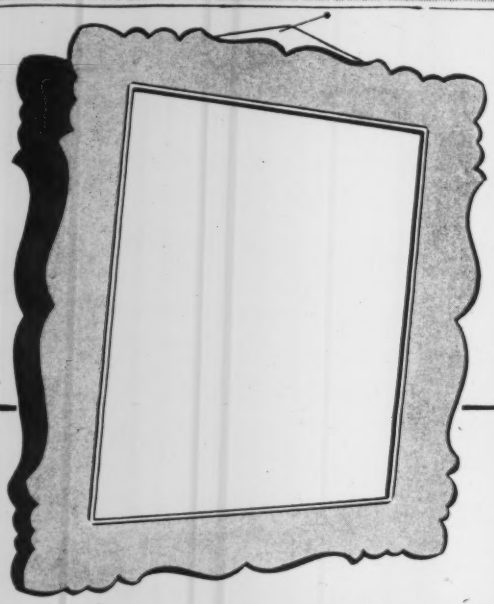
Resins for Protective Coatings

FOR YOUR Calcium Chloride NEEDS

WRITE or WIRE:

MICHIGAN ALKALI COMPANY

General Sales Office: 60 E. 42nd St., New York, N. Y. Plants: Wyandotte, Michigan



Portrait of an erasure on ARKWRIGHT TRACING CLOTH

See it? You can't – no matter how hard you look! For smooth, highly transparent Arkwright Tracing Cloths have a special finish that takes erasures perfectly, without "ghosting". Pencil marks come off cleanly and quickly – erased areas will take ink without feathering or letting ink chip off when it dries. That means easier work for every draftsman – and neater, "snappier" blueprints.

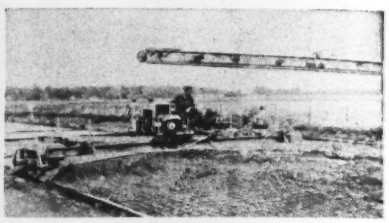
See Arkwright Tracing Cloths at your dealer's, or write us direct for large working sample. You'll find that for permanent transparency, freedom from pinholes, quality of drawing surface, as well as finish, these cloths are unexcelled by any tracing cloth made anywhere. Arkwright Finishing Co., Providence, R.I.

Arkwright TRACING CLOTHS

corner drills, non-reversible and reversible types, are on the market. Governor controlled, the smooth, even rotation of the rotary type motor will be particularly valuable for tapping operations, and the compact design and extremely strong construction hold lost time and delays to a minimum. Ask for Bulletin P1226.—*Independent Pneumatic Tool Co., 600 W Jackson Blvd., Chicago, Ill.*

Asbestos-Cement Pipe

K&M "Century" asbestos-cement pipe is now available in 18 ft. lengths in the 6 in. and 8 in. sizes with the 13 ft. length still available for trench conditions which make shorter length more advantageous. The longer lengths eliminate 113 couplings per mile of line and thus reduce the time and cost of installation as it reduces the joints 28 percent.—*Keasbey & Mattison Co., Ambler, Pa.*

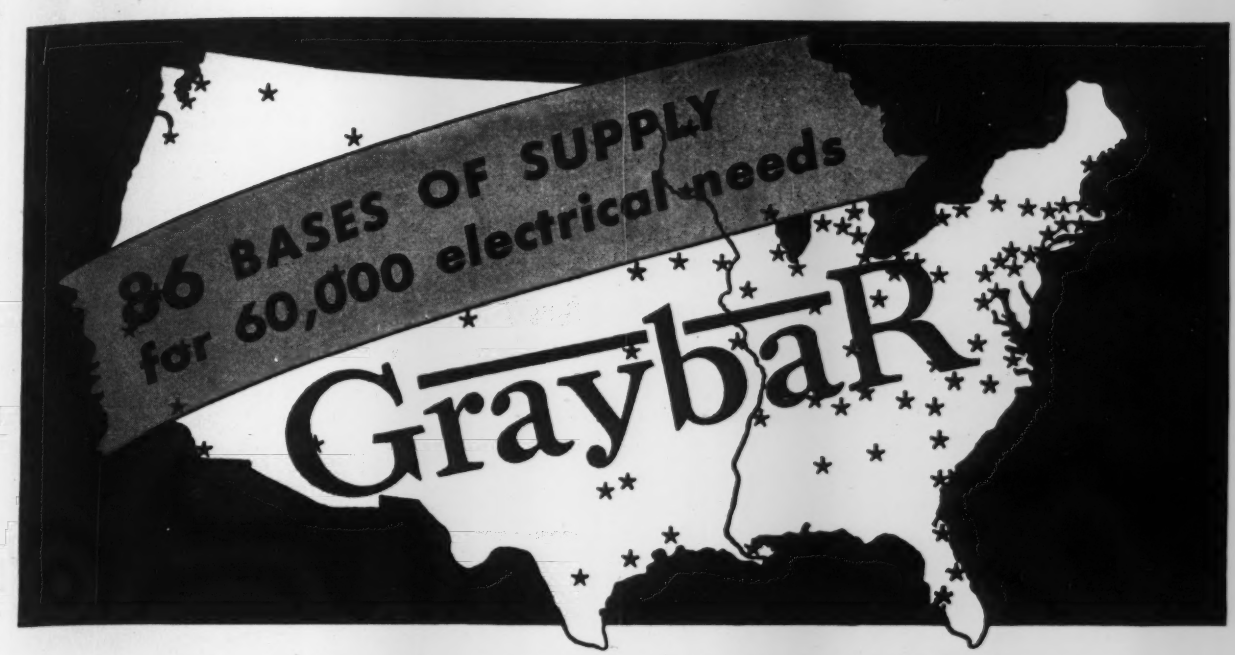


Finishing Machine

Blaw-Knox has improved its gasoline-driven finishing machine, introducing new features designed to produce what is said to be the greatest flexibility of operation ever available in equipment of this kind. Highlighting improvements in this new "Model XB" finisher are provisions for six traction and four screed speeds. It is possible to operate the traction at slow speed and the screeds at one of the higher speeds to get a superior finish. An automotive unit type of transmission controls all functions of the finisher, the traction wheels have removable rims facilitating adaptation to various types of paving work, screed bearings have been improved and a 9 in. wide front screed and 12 in. wide rear screed are provided. Transportation of the finisher from job to job is conveniently handled by a novel moving truck which is simply fastened to the top of the transverse frame of the finisher without dismantling of the machine.—*Blaw-Knox Co., Pittsburgh, Pa.*

Rubber-base Steel Paint

Truscon announces a new rubber base metal coating especially adapted to all types of exposed iron and steel. The name is Paratex Metal Coating and as the name implies it also protects aluminum, copper, galvanized metal. This new type rubber base paint brushes well and dries fast, is unaffected by water and very resistant to chemicals such as lime.



GRAYBAR COVERS THE COUNTRY

To Speed the Supplies for Electrical Construction

Free
BULLETIN
TELLS THE STORY

This 24-page bulletin will help introduce Graybar. Describes warehouse facilities, personnel set-up, illustrates a representative group of popular Graybar products . . . wiring supplies, motors and controls, lighting units, signaling equipment, and the like. Also lists leading supplier-manufacturers whose products are available through Graybar.

WRITE FOR A COPY TODAY

When construction work involves a race with time, there's a lot to be gained by a supply base that's near at hand, staffed with men familiar with local conditions. And for those who are doing your *electrical* construction work, there's an equally significant speed-up factor in being able to get everything that goes into a job from a "one-call" source within rapid delivery range.

GRAYBAR's network of 86 branch houses is so widespread that even out-of-the-way locations are never isolated from action-service. What's more, GRAYBAR Representatives have had so much experience serving big industrial projects the country over that it's pretty hard to face them with unusual requirements or exceptional demands. When somebody says: "We've got to have a carload here next week," they start thinking of ways and means, instead of excuses. If necessary, they'll start the wires humming to other GRAYBAR warehouses to rally emergency supplies.

Another important thing about GRAYBAR service: You're sure of soundly built, dependable electrical equipment and supplies, even when there isn't time for careful investigation and comparison. GRAYBAR selects the lines it will distribute only when they meet its own standards of satisfaction-insurance on the job.

GraybaR
IN OVER 80
PRINCIPAL CITIES
Executive Offices:
Graybar Bldg., New York

A FEW KEY PRODUCTS

Cable • Conduit • Conduits • Fittings • Flexible Cord • Fuses • Instruments • Lamps • Lighting Fixtures • Motors & Controls • Panel Boxes • Signaling Equipment • Tape • Tools • Transformers • Ventilating Equipment • Wire—All Types • Wiring Devices.

GraybaR
Everything Electrical
GraybaR
ELECTRIC COMPANY

WE MAY HAVE TO SAY *NO!*

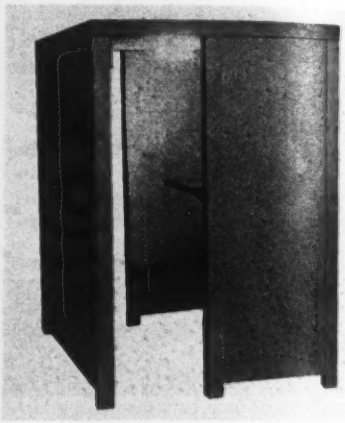
★ The Twin Disc Clutch Company is solidly behind the National Defense Program. Priorities are being given the right-of-way. This, you, as a patriotic citizen will agree, is the right attitude to take even though it may mean some sacrifice on your part when we have to say "No" to your urgent requests for immediate delivery of a new clutch.

With our greatly increased facilities, a part of our production can be devoted to non-priority business if you, as a valued customer, will co-operate by anticipating your needs and not asking for an impossible delivery date.

Through our 28 parts stations, we have been able to keep owners of Twin Disc-equipped machines supplied with needed parts and we expect to be able to maintain this service. TWIN DISC CLUTCH COMPANY, 1327 Racine Street, Racine, Wisconsin.

Illustrated: Model E Heavy-Duty Clutch.

acids, and fumes of various kinds. Paratex Metal Coating is expected by its makers to replace conventional type metal paints because of its exceptional durability and resistance to rusting and corrosion. Ask for Bulletin No. 518.—*Truscon Laboratories, Caniff & G.T.R.R., Detroit, Mich.*



Acoustic Booth

Designed to meet the need for a large "zone of quiet" for conferences in noisy factories is a new conference booth with walls of sound absorbing material to soak up noise. Acoustic construction of the booth makes doors unnecessary, permits ready access and provides ample natural ventilation. It is easily portable and can be assembled and ready for use in a few minutes time. Outside dimensions are 56½ in. by 54½ in. by 79½ in.—*Burgess Battery Co., Acoustic Div., 530 W. Huron St., Chicago, Ill.*

Pneumatic Tired Loader

Haiss has brought out a larger wheel-mounted loader which is a counterpart of the creeper-tread model. It has a capacity of 3 to 5 cu.yd. per min. in heavy duty work up to the handling of larger sizes of crushed stone. This machine, the Model 80W, has a road speed up to 5½ mph. and a power crowding drive geared for 18.6 fpm.—*George Haiss Mfg. Co., Inc., 140th St. & Rider Ave., New York City.*

"Actual check shows that no other drifter in our mine has such low maintenance costs."
"Your "built-in" feed provides the smoothest action we have ever seen in a drifter."

WINNING PRAISE Wherever It's Used —Gardner-Denver CF89H Drifter!

"DEMONSTRATED—sold"—that's the usual report on the CF89H Drifter—the sensational, new Gardner-Denver 3½ in. automatically fed drifting drill. With its double acting, *built-in* feed motor, this medium weight machine not only has far less recoil action than a hand-cranked drifter, but its overall maintenance is actually lower than that of a hand-cranked drill! The CF "continuous feed" with its uncanny ability to hold the drill in exactly the right relation to the steel, assures higher drilling efficiency.

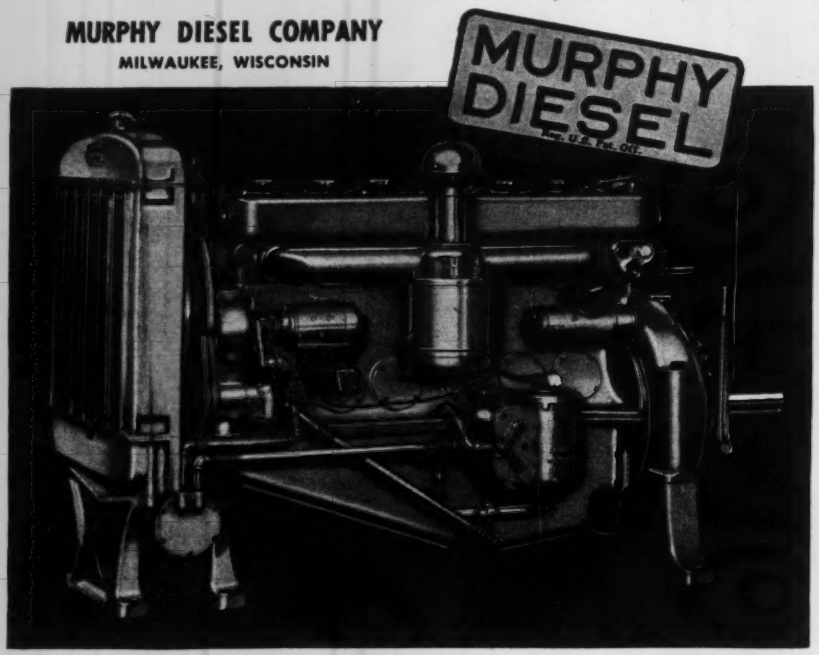
Find out why so many users say that this is the fastest, most economical drifting drill in its class. For complete specifications, write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER
Since 1859

MORE POWER..MORE PROFITS!

Rugged... compact... dependable... full-rated horsepower. Available in sizes 85 to 200 H.P.; Generator sets 55 KW to 115 KW, A.C. or D.C. Write for complete information.

MURPHY DIESEL COMPANY
MILWAUKEE, WISCONSIN



Just Out!

How to protect people and property against danger from air attack—

THIS book gives a complete treatment of defense against air raids, showing the nature of destruction caused by them and what protection is possible, and describing the methods, equipment, and organization necessary to effect it. Based largely on experience in London and European cities, it gives the most authoritative possible view of civil air defense, making clear all aspects of the problem of protecting the population and industrial, business, and home properties, and fully outlining the means by which everyone, from state and municipal authorities to the individual citizen, may plan and carry out protective measures.

CIVIL AIR DEFENSE

By Augustin M. Prentiss
Lt. Col., General Staff Corps, U. S. Army

334 pages, 6 x 9, illustrated. $2.75

The book describes the various means and methods of air attack and the effects produced by each; contains details of blast and fragmentation effect of bombs, placing and structure of shelters, gas-proofing requirements, British Code governing construction of shelters, and other specific data of value to construction men.

EXAMINE IT 10 DAYS—SEND THIS McGRAW-HILL ON-APPROVAL COUPON

McGRAW-HILL BOOK CO., INC., 330 W. 42nd St., N. Y. C.
Send me Prentiss—Civil Air Defense for 10 days' examination on approval. In 10 days I will send $2.75, plus few cents postage, or return book postpaid. (Postage paid on orders accompanied by remittance.)

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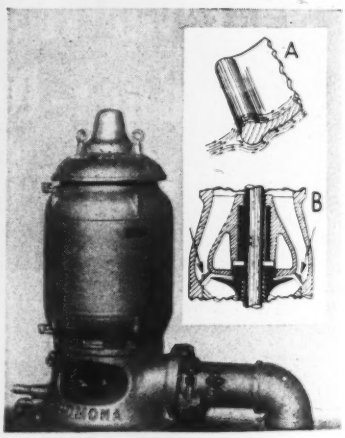
(Books sent on approval in U. S. and Canada only.)

Mobilcrane

A new improved Mobilcrane, the Model 705 WM, has several new features among which are air control of all movements, independent boom hoist, independent travel and swing motion, and hook rollers. This machine is not a truckcrane. It is mounted on pneumatic tired wheels but is operated by one man and one motor. A feature of this extra strong machine is the three point suspension and it is equipped with leveling jacks on the front axle to keep the upper body on an even keel. The independent travel feature is operated by a Twin-Disc clutch with change of direction being made through bevel gears. This enables the machine to make a lift, swing and/or travel with the load in any direction.—*The Osgood Co., Marion, Ohio.*

Track Roller Lubricant

A viscous track roller lubricant for crawler type tractors which is also suitable for army tanks of similar mechanism has been developed. The new product protects against dirt and other contaminants, has high resistance to water and has a consumption ratio 20 to 25 percent lower than other lubricants.—*Standard Oil Co. of Indiana, Chicago, Ill.*



Vertical Turbine Pump

Improvements in the design of Pomona vertical turbine pumps have been made which eliminate hydraulic losses in the pumps, thereby increasing efficiency as much as 10 percent. These improvements, now included in all sizes, involve fundamental design changes in the guide vanes, the function of which is to alter, from horizontal to vertical, the flow direction of fluids being pumped. The advance vane ends have been made of a bulbous shape, it being found that regardless of the flow direction of the fluid its direction would always be substantially tangential to the vane surface. Thus, greater uniformity

IN THE QUEENS-MIDTOWN ELEVATED HIGHWAY

WORKING under pressure to avoid a bottle neck in opening the Queens-Midtown Tunnel in New York, this 4,600 ft. viaduct approach, connecting the Queens end of the structure with approach highways, was built at record speed.

Here again for the foundations, NATIONAL Seamless Pipe Piles lived up to their well-established reputation for fast driving wherever subsurface conditions are unusually tough and difficult.

Nearly 5,000 tons of NATIONAL Pipe Piles, 18″ O.D. with ½″ wall thickness and from 35 to 90 ft. long, were driven to rock in clusters of 6 to 10 piles as illustrated above. They not only went down fast with a minimum of trouble, but produced a foundation that will meet every requirement of strength, permanence, and economy.

No matter what the conditions faced in setting foundations, NATIONAL Seamless Pipe Piles satisfy all requirements. They penetrate where other pilings fail. Have greater supporting strength. Cost less for deep and difficult penetration. Can be inspected full length after driving. No other type of foundation piling offers *all* these advantages. Bulletin 27 gives the complete story. It should be in your files.

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL

Compressor Savings

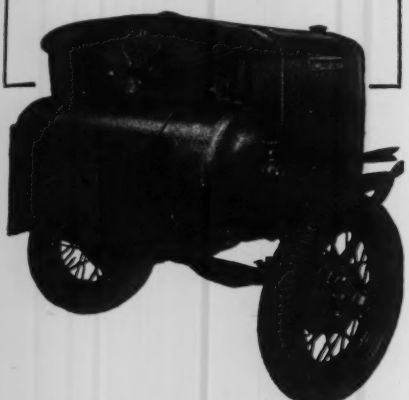
that mean $'s to you!

Use

low-priced, lightweight

SMITH AIR COMPRESSORS

Think of the many advantages of such a lightweight, portable compressor! Move it easily from one job to another. Tow it at permissible truck speeds. Made with FORD MOTORS and standard parts—its ruggedness and efficiency are sources of constant satisfaction to users everywhere. Repairs and parts available at any Ford garage. Priced far below standard compressors of equal capacity. 60 cu. ft. size uses only 1 gal. of gasoline an hour! (Head equipped with high speed compressor valves; automatic unloading and idling.) All the power you'll need for a majority of compressor work. *Why not take advantage of this important way to save?*



With a Ford Motor and shop facilities you can assemble your own Smith Compressor. We will furnish a Smith Compressor Head and Accessories with complete instructions for mounting.

Write for free booklet

GORDON SMITH & CO.

430 College St. Bowling Green, Ky.

of flow pattern is secured, friction is reduced and efficiency of fluid lift is increased. Eddy currents are not developed as under former circumstances. The new design can be added to presently owned equipment by substitution of a new bowl assembly.—*The Pomona Pump Co., St. Louis, Mo. and Pomona, Cal.*

Slope-Meter

The Slope-Meter shown above is a precision instrument which, when mounted on highway construction machinery, will conveniently measure all types of slopes. For example, when the bubble, shown as a black dot, is at Fig. 4 it indicates a 4 to 1 slope. The device is said to assist considerably in constructing and checking variable slopes while the machines are in motion, eliminate costly hand checking, speed up night work, and avoid wavy slopes.—*The Slope-Meter Co., 1014 E. 25th St., Minneapolis, Minn.*

Overhead Loader

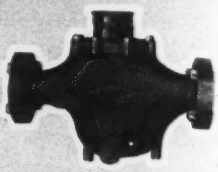
For cleaning ditches on highway maintenance, the Athey MobilLoader on a Caterpillar diesel 4 tractor loads a 1½ yd. truck with one bucket load.—*Caterpillar Tractor Co., Peoria, Ill. and Athey Truss Wheel Co., Chicago, Ill.*

Kotal

Kotal is a product manufactured for use in asphalt highway construction and maintenance. Kotal combines with quicklime to form a plastic like compound that is completely unaffected by water. This compound may be used to waterproof all kinds of aggregates taken directly from wet or frozen stock piles during any season of the year for use in patch making, surface treatment, road mix or penetration work. Kotal is used in plant mix, either by first pretreating and then adding the regular asphalt or by putting the quicklime on the undried aggregate, followed by the asphalt to which Kotal has been previously added. —*The Asphalt Treatment Corp., 140 Cedar St., New York City.*

PITTSBURGH EUREKA "B" *Current Type* METERS

for the Accurate Measurement of Large and Rapidly Flowing Volumes

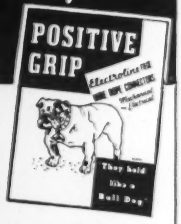


This meter is of the velocity type, commonly known as a propeller or current meter. Typical applications include main water supply lines, laundries, lines supplying factories or other industrial services requiring the measurement of large volumes without retardation of the flow or perceptible reduction of the effective head or pressure. Pittsburgh Current Meters are extremely simple in design and carefully constructed. They are made in sizes from 2" through 12".

MASTER METER MAKERS

PITTSBURGH EQUITABLE METER CO.
MERCO NORDSTROM VALVE CO.
410 N. LEXINGTON AVE., PITTSBURGH, PA.

PROLONG *Wire Rope* LIFE



NEW BOOK SHOWS HOW!

The gripping unit in Electroline-Fiege Connectors "holds like a bulldog," yet graduates the compression from rear to front preventing crystallization, fraying and early rope failure. Fully described in this new Bulletin.

Send for your copy of this publication. It will give you complete performance data on the easily installed, streamlined, cable connector which the Construction Industry is adopting.

Electroline Company

4004 S. LaSalle St. Chicago, Ill.

NEW PUBLICATIONS

Biofiltration System—A new bulletin tells, with photographs, descriptive matter, flowsheets, layouts and operating data, the complete story of the Biofiltration System of trickling filter treatment. Also included are general dimension drawings of major equipment units employed, and data upon which designs may be based.—*The Dorr Co., Inc., 570 Lexington Ave., New York City.*

Tile Floors—Natco Flat Arch Floors and Tile Floor Systems are illustrated and described in a catalog section now available.—*National Fireproofing Corp., Pittsburgh, Pa.*

Piping—To help the users of piping material get the maximum out of their equipment, Crane Co. has initiated a series of printed folders containing practical suggestions on how to eliminate or reduce interruption to service, how to train new men in the handling of piping equipment, how to get longer service under peak load operations, and how to make the best selection of the valves and fittings for every service need. The first of these folders is now available.—*Any Crane Branch or Crane Co., Chicago.*

Loaders—A new bulletin describes the Sullivan mine car loader covering the HL-2, a simple rugged unit for loading in narrow headings. Ask for Bulletin 76-L. — *Sullivan Machinery Co., Michigan City, Ind.*

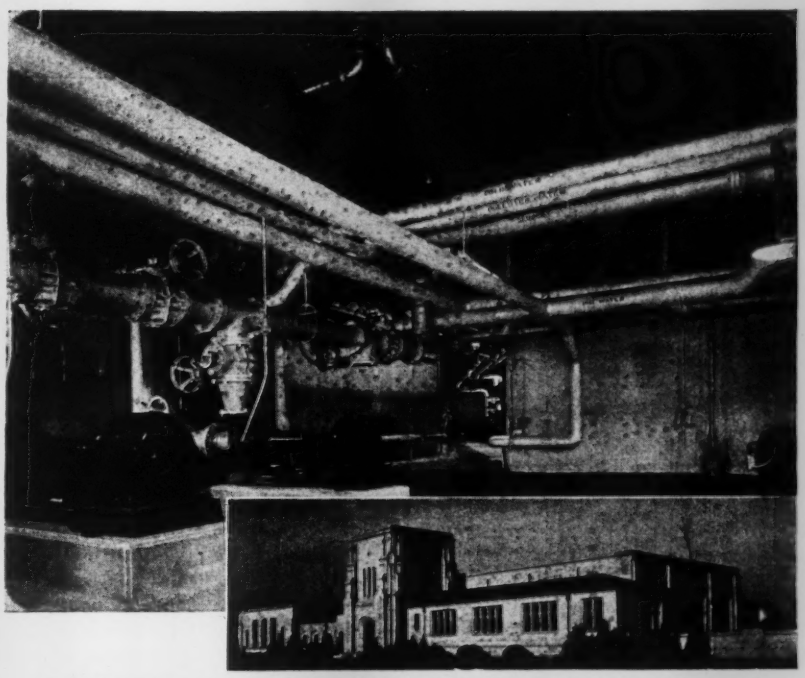
Brake Blocks and Frictions—An illustrated brochure comprehensively pictures numerous modern types of GATKE friction materials for all requirements of excavating, road building and construction equipment, as well as trucks, tractors, etc.—*GATKE Corporation, 228 N. La Salle St., Chicago, Ill.*

Compressors—Schramm portable air compressors for construction work are described in a mailing piece just issued. —*Schramm, Inc., West Chester, Pa.*

Asphalt Equipment—Bulletin Q-1 describes the Littleford 84-hp. tar and asphalt kettle for maintenance use.

Bulletin Q-3 describes the Trail-O-Roller, a readily portable maintenance roller. — *Littleford Bros., Cincinnati, Ohio.*

Rubber Tie Plates—Firestone Rubber Tie and Crossing Plates, designed specifically for heavy duty railroad service, are described fully in a new bulletin.—*Portable Plating & Equipment Co., Chicago, Ill.*



FORT WAYNE GOES SANITARY
WITH LATEST TYPE SEWAGE DISPOSAL PLANT
Naturally **THIS CALLED FOR**

Carey **HEAT INSULATIONS**

Fort Wayne, Indiana, recently has rebuilt its entire sewage and drainage systems, climaxing the improvement with one of the most modern and efficient sewage disposal plants in the country.

The cold water lines were insulated with CAREY Perfecto Wool Felt; hot water and low pressure lines with CAREY 85% Magnesia; engine exhaust lines with 2-inch thick CAREY Hi-Temp No. 12 and CAREY 2-inch 85% Magnesia. The insulations were applied by the Asbestos Insulating Company.

Modern civic and industrial improvements everywhere are demanding higher and higher efficiency, which means—more and more CAREY Insulations. Whatever your insulation problem, CAREY Insulations will solve it and insure maximum savings in fuel and heat.

A nationwide CAREY engineering and erection organization is at your service. Send for Insulation Catalog—address Dept. 30.

THE PHILIP CAREY MFG. COMPANY • Lockland, Cincinnati, Ohio

BUDA Journal JACKS

Use For Heavy Shoring They Will Not Settle Under Load

DUE to the safety retarding spring, an exclusive feature in all Buda Ball Bearing Journal Jacks, all creeping and accidental lowering of the load is prevented. For this reason Buda Ball Bearing Journal Jacks were extensively used to support steel structural columns in Chicago's Loop during subway tunneling operations. (See picture above.) These 35 ton jacks provided a safe, dependable support which was readily adjusted to the correct height, without any danger of load settling. This is just one of the many jobs where Buda Tested Jacks are solving tough construction problems!

Builders of Quality Lifting Jacks for 31 Years

THE BUDA COMPANY
ESTABLISHED 1881
Harvey (Chicago Suburb) Illinois

Diesel and Gasoline Engines—Railroad and Contractor's Equipment

• *Write for FREE factual Buda Jack Bulletin covering the complete line of over 170 sizes and models engineered for every lifting job.*

"Water Works Preparedness"

calls for the dependability of

SMITH • • • EQUIPMENT

Adequate water supply for camps, new industrial plants, industrial housing and fire protection has overnight become a matter of national concern. In these dangerous days, as in the last war, Smith Valves and Hydrants are being called upon for added service by the Government and private concerns. They have proven their worth as among the most effective weapons for "Water Works Preparedness."

THE A. P. SMITH MFG. CO.
EAST ORANGE, N. J.

7 So. Dearborn St., Chicago, Ill.
1530 Upson Avenue, El Paso, Texas
315 N. Crescent St., Flandreau, S. D.
901 Wm. Oliver Bldg., Atlanta, Ga.
59 Oak Vale Ave., Berkeley, Calif.
524½ First Ave. S., Seattle, Wash.

Admixture—A folder describes Tricosal, an admixture for cement which increases its workability, uniformity, waterproofness and general characteristics.—*Eastern Tricosal Co., Inc., 101 Park Ave., New York City, or the Tricosal Co., San Francisco and Los Angeles.*

Amsco—Two new catalogs describe the power shovel dippers and dipper parts and power shovel and dragline parts available from wear-resisting materials.—*The American Manganese Steel Division of the American Brake Shoe & Foundry Co., Chicago Heights, Ill.*

Insulating Concrete — A revised bulletin describes Mascrete, mechanically aerated concrete with each air cell supported and braced with tiny trusses of tough mineral plates to form a lightweight concrete. The precast Masco sandwich plank construction for insulating and roof planks is described as a substitute for cork.—*Munn and Steele, Inc., 130 Lister Ave., Newark, N. J.*

Paver—Improvements in the Ransome 34-E single drum paver are fully illustrated and described in an eight-page, two-color bulletin just released. Full hydraulically control of boom swing, discharge chutes and water valve remain the outstanding features according to manufacturer.—*Ransome Concrete Machinery Co., Dunellen, N. J.*

Small Tools—Black & Decker have just published another in a series of handbooks, a 56-page data book on Power Assembly Tools; Portable Electric Screw Drivers, Nut Runners and Tappers. Included is information as to size of pilot holes, bolts, nut, cap screw and lag screw sizes; tap drill sizes, etc. —*Black & Decker Mfg. Co., Towson, Md.*

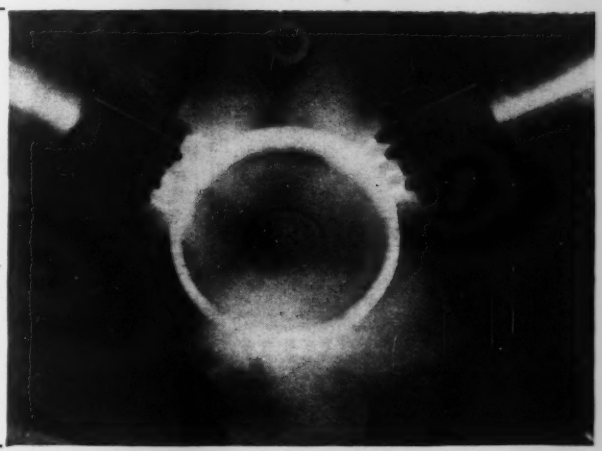
Tile Floors—A 32-page "Architect's Handbook for Resilient Tile Floors," just published, will be sent free to interested parties. Described as a first book of its type ever to be issued, it contains no advertising, gives all essential data needed on resilient tile floors, compares—without bias—cork, asphalt and rubber tile plus various cove bases. Included are cost comparison charts, lists of do's and dont's, proper underfloors, sizes and color lists, etc.—*David E. Kennedy, Inc., 58 Second Ave., Brooklyn, N. Y.*

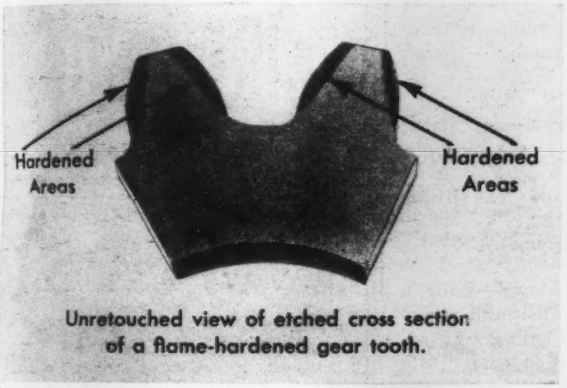
Conveyor System—A 24-page book describes a distinctly new and different power-operated conveyor system for the positive and continuous conveying of flowable granular, crushed, ground or pulverized materials in capacities of 1

OXY-ACETYLENE FLAME-HARDENING makes wearing parts last longer . . .

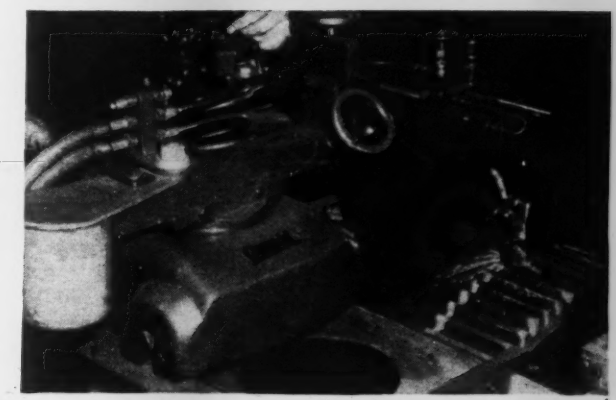
1. What it is and how it's done

Oxy-acetylene flame-hardening imparts a hard case to wearing parts to make them last longer. This is done by heating the area to be hardened with oxy-acetylene flames, and then quenching with water or oil. Commonly used steels and high-tensile cast iron can be flame-hardened successfully. Small areas can be hardened by the "spot" method, using a hand welding blowpipe. Larger areas are usually hardened by mechanized equipment, using the "progressive" method or—as shown in the illustration at the right—the "spinning" method.





Unretouched view of etched cross section of a flame-hardened gear tooth.



2. What its advantages are

In many cases, oxy-acetylene flame-hardening is not only the best method, but the *only* practical method. Some of its advantages are:

- Parts of any size or shape can be hardened.
- There is no appreciable distortion.
- Toughness of the core is unaffected.
- Chemical composition of the metal is unchanged.
- Penetration can be closely controlled.
- The hardened area does not spall off.
- It permits use of cheaper base metals.
- Only a moderate equipment investment is required.

3. Typical parts being hardened

In the illustration above, Oxweld flame-hardening equipment is being used to impart a hard case to the teeth of a crane gear—at only the points where wear occurs. A few of the many other parts which are hardened—or fabricated—with the help of this oxy-acetylene process are:

Sprockets	Cams	Piston Rods
Dies	Crane Wheels	Pump Plungers
Sheave Wheels	Bearing Raceways	Cross-heads
Shear Blades	Shafts	Saw Blades

Linde can supply the gases, the apparatus, and help in using flame-hardening. If you are interested in giving longer life to wearing parts, *talk it over with Linde!*

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

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For Wet and Dry Grinding of concrete, Brush cleaning Forms, cleaning steel, pumping water, sanding and polishing. Many jobs other than vibrating can be done with Master Vibrators. It is only necessary to remove the vibrating head by unscrewing same from the casing and screwing on any Master High Speed Tool Attachment.

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Water Supply Lines
Subaqueous Intakes or Outfalls
Storm and Sanitary Sewers
Culverts and Drains

(See Page 93, ENR July 31)

Lock Joint Pipe Co., Ampere, N. J.
Established 1905

to 140 tons per hour, known as the Link-Belt-Bulk-Flo System. Ask for Book No. 1975.—*Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.*

Underdrains — Engineering Bulletin No. 2 describes the Aloxite Brand Porous Underdrain Systems for Rapid Water Filters and Softeners. The bulletin treats the history and development of the Porous Underdrain Systems and devotes several pages to design.—*The Carborundum Co., Niagara Falls, N. Y.*

Compressors—Heavy-duty horizontal duplex compressors for single- or two-stage compression are the feature of a new bulletin, No. 192, now available.—*Pennsylvania Pump & Compressor Co., Easton, Pa.*

Shades—Shading for factories is growing in importance this summer with rapidly expanding production, making timely a new bulletin illustrating various designs for all types of industrial sash, including skylights and monitors. It is said that 30 to 40 percent more light and air can be admitted while reducing heat and glare appreciably.—*Hough Shade Corp., Janesville, Wis.*

Jacks—A 36-page pocket-size catalog describes with complete specifications 289 different models and sizes of jacks ranging from 1½ to 100 tons lifting capacity. Ask for Catalog No. 300.—*Joyce-Gridland Co., Dayton, Ohio.*

Quarry and Pit Machinery—Bulletin No. 266M describes the Telsmith equipment for mine, quarry and gravel pit. This 36-page bulletin is in colors with excellent pictures and tests describing completely all types of equipment for production of materials.—*Smith Engineering Works, Milwaukee, Wis.*

Land Clearing—A new booklet on land clearing, 12 pages in two colors, has just been released which shows use of modern methods in machinery for clearing such projects as highways, reservoirs, airports, etc. Methods and equipment are explained.—*La Plant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa.*

Bearings—A new catalog describes the properties and uses of "Selflube" Porous Bearings, and furnishes complete details of the correct method of installation. Different shapes are illustrated and standard sizes are listed.—*The Keystone Carbon Co., St. Marys, Pa.*

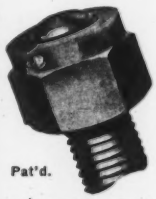
Belt Lacing—A new bulletin describes steel belt lacing for joining or repairing machine and conveyor belts. The publication contains information on typi-

Specify

Cutout Section shows locking nut in place

where

VIBRATION
is the problem



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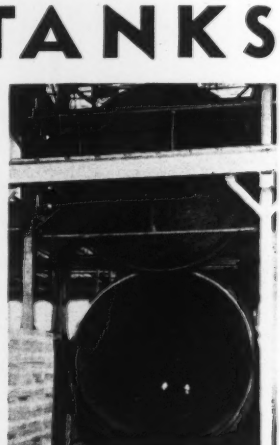

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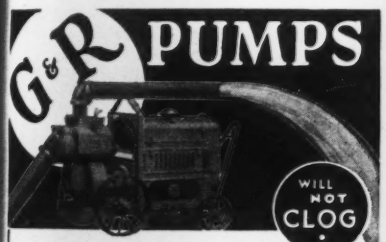

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cal applications, types and sizes available as well as prices applying.—*Mill Supply Division of the Bristol Co., Waterbury, Conn.*

Wire Rope—"Rope Dope" is the title of an educational folder giving information on reeving of lines, and proper care of wire rope.—*Union Wire Rope Corp., Kansas City, Mo.*

Valves—A new folder is available on Union Bonnet Bronze Globe and Angle Valves, covering new improvements on the line.—*Reading-Pratt & Cady Division of the American Chain & Cable Co., Inc., Reading, Pa.*

Waterproof Clothing—Catalog No. 203 describes the safety, sporting and regular boots; service coats and work suits; rubber and oiled clothing, aprons, hats; rubber blankets and gloves available from Goodall.—*Dept. P, Goodall Rubber Co., Philadelphia, Pa.*

Paver—An attractive catalog profusely illustrated describes the 34-E single-drum Multi-Foote Paver. The 34-E is said to offer 25 percent more capacity than the 27-E, and yet require no additional equipment or labor.—*Foote Co., Inc., Nunda, N. Y.*

Cleaning Manual—A 12-page booklet prepared primarily for maintenance superintendents and foremen and packed with the latest up-to-the-minute "how to do it" information on cleaning a wide range of roadbuilding and construction equipment for repair and repainting or for regular maintenance, is now available.—*Oakite Products, Inc., 57 Thames St., New York City.*

Lighting Accessories—A 40-page catalog describes Thompson disconnecting and lowering hangers, shock absorbers, extension devices and accessories, special appliances, chain and cable fittings, and wire cable for lighting fixtures.—*Thompson Electric Co., Cleveland, Ohio.*

Air Conditioning—Trane announces a 15-ton self-contained air-conditioner, completely described in the new Bulletin DS-362. Also announced is Bulletin DS-361 which describes the Trane line of reciprocating compressors available in 3- to 50-ton capacities for use with refrigerants.—*The Trane Co., La Crosse, Wis.*

Metal Spraying—"The History, Purpose and Practice of Metallizing" is the title of a 50-page, illustrated booklet, which explains the application of metal spraying to reducing costs and speeding work in industry.—*Metallizing Company of America, Inc., 562 W. Washington Blvd., Chicago, Ill.*

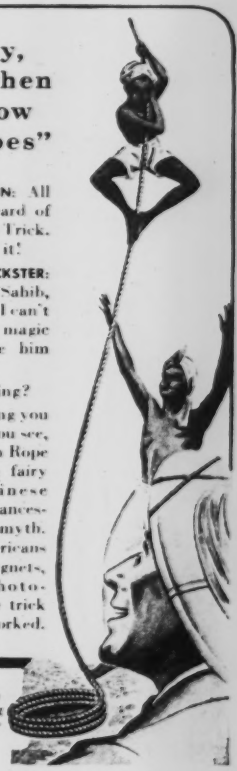
"It's easy, Sahib, when you know your ropes"

VISITING FIREMAN: All my life I've heard of the Hindu Rope Trick. Now I'm *seeing* it!

HINDU ROPE TRICKSTER: That's the trick, Sahib, you don't see it. I can't send a boy up a magic rope and make him disappear.

VF: Am I dreaming?

HINDU: Something you ate, no doubt. You see, Sahib, this Indian Rope Trick is just a fairy tale. The Chinese started it. My ancestors spread the myth. Today, you Americans fake it with magnets, and phony photographs. But the trick has never been worked.



Taken from Plymouth Rope Advertising Campaign in Time Magazine.

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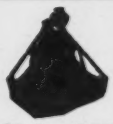
Hayward Buckets



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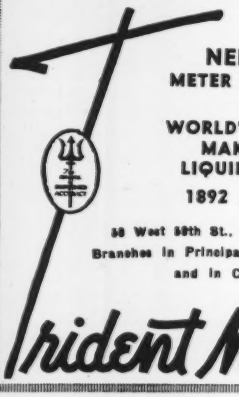

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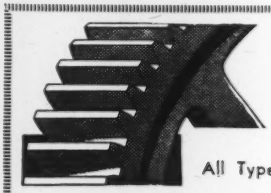

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ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
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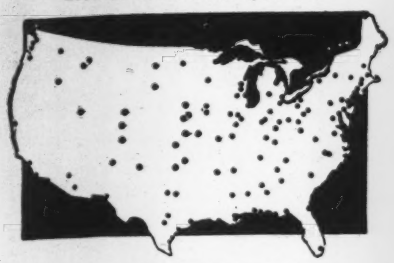
Location of ENR Correspondents



Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply — Unclassified
Sewers, Waste Disposal — Latin America
Bridges, Grade Cross'gs — Public Buildings
Streets & Roads — Commercial Buildings
Earthwork, Waterways — Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: All low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

WATER SUPPLY

PROPOSED WORK

Ala., Florence—S. C. Harlan, city comr., expand WW sys. $100,000.

Ala., Muscle Shoals—WW and filter plant.

Calif., Madera—Plans $27,000 bond election water sys. exten.

†Colo., Fort Logan—U. S. Eng., 1709 Jackson St., Omaha, Neb., 5,000 ft. water lines, 4,000 lin. ft. gas lines, 3,000 ft. sewers, 2,500 ft. electric lines, for 500 man reception center. $50,000.

Idaho, Nampa—Bids soon, 500,000 gal. water tank.

Ind., LaPorte—A. Baker, supt., increasing WW sys. to 7 m.g. daily, wells, bldgs., etc. $115,000 or more with equip.

Ind., Oaktown—Bids soon water supply. Samuel R. Hunter, 608 S. Dearborn St., Chicago, Ill., engr.

Ia., Council Bluffs—S. W. McCall, mayor, water plant building, new equip. $40,000.

Miss., Biloxi—Mayor, WW imprvs., c.i. pipe fittings, etc. $67,000 bonds voted. J. T. Collins, Biloxi, engr.

Mo., Florissant—C. G. Peters, city clk., $15,000 bond election Aug. 23, water distr. sys. exten., in St. Ferdinand, $15,000.

O., Canton—Stark Co., exten. watermains to portion Reedurban-Genoa sewer district. Over $25,000. S. S. Senter, Canton, engr.

★**O., Canton**—Surface water supply, $2,000,000. Havens & Emerson, Leader Bldg., Cleveland, O., consult. engrs. CD 7/22—ENR 7/24.

★**O., Sandusky**—A. J. Lauber, city mgr., water purification plant, buildings, storage tanks, concrete basins, water lines. $545,000. E. E. Hastung, city engr.

O., Vandalia—C. Senseman, mayor, water supply sys. $570,000. Applied for PWA aid. G. R. Steller, 213 Monterey Ave., Dayton, village engr. Champe, Finkbeiner & Associates, 725 Nicholas Bldg., Toledo, consult. engrs. CD 7/30—ENR 8/7.

★**O., Warren**—Water plant exten. $600,000. Havens & Emerson, Leader Bldg., Cleveland, consult. engrs. CD 8/6.

Ore., Eugene—Glenwood Water Dist., sys. to serve 100 homes southeast of here.

Ore., Forest Grove—Imprv. water distr. and sanitary sewerage sys. $126,911. WPA.

★**Ore., Pendleton**—9 m. g. pipeline, from north fork of Umatilla River, 2 reservoirs, 8 m. g. capacity. $1,000,000. J. W. Cunningham, Spaulding Bldg., Portland, engr.

Ore., Springfield—Bond election Nov. 4, water sys. $165,000.

Pa., York—York Water Co., W. F. O. Rosenmiller, pres., 6 filter units, filtration plant. $75,000.

★**R. I., Scituate**—City of Providence, D. J. Roberts, mayor, City Hall, Providence, covered reservoir, 30 in. line, Quonset Point, $2,000,000.

†S. C., Charleston—Public Wks. Officers, Navy Yard, 500,000 gal. shallow depth storage elevated tank. Government to install concrete footings.

Tenn., Humboldt—Mayor, exten. WW sys. $75,000.

Tex., Arlington—W. F. Altman, mayor, water and sewer exten, sewage disposal plant imprvs. $125,000. Applied for WPA. funds. Myers & Noyes, Tower Petroleum Bldg., Dallas, engrs.

Tex., Beaumont—Jefferson Co. Fresh Water Sup. Dist. 1, c/o L. P. Howell, WW sys. pumps, hydrants, etc. $329,930. Applied for PWA funds. J. W. Summerville, 210 Liberty Bldg., engr.

Tex., Dallas—Dallas Waterworks Sys., two 1 m.g. elevated steel storage tanks. $100,000.

Tex., Grand Prairie—Voted bonds, WW sys. $75,000.

Tex., Velasco—E. F. Roeller, mayor, WW and sewerage sys. addn. $150,000. Applied for PWA fund. Garrett Eng. Co., 918 Richmond St., Houston, engrs. CD 6/30—ENR 7/3.

Tex., Weatherford—C. F. Russell, mayor, WW and sewers. sys. (Tex. 41-184) $110,272. S. M. Field, Weatherford, engr. Applied for PWA funds.

★**Va., Arlington**—F. C. Hanrahan, mgr., Arlington Co. and engr., water and sewerage sys. exten., incinerator establishment, etc. $2,000,000.

Wash., Everett—Pinehurst Water Dist., rehabilitation water sys. $75,000. Bonds voted. CD 7/1—ENR 7/10.

N. S., Sydney—Water facilities imprv. $25,000.

BIDS ASKED

Bids Asked August 18

N. Y., Albion—2 story, 49x75 ft., brick, concrete, WW service building, E. Bank St., $40,000. Wiard & Martin, 315 Alexander St., Rochester, archts.

Bids Asked August 20

Md., Hyattsville — Washington Suburban Comn., Owens Ave., c.i. watermains, Contr. 134W; c.i. watermains and vitr. sewers, Contr. 135 W & S; adv. ENR 8/14.

Bids Asked September 8

Ia., Corning—Supplementary water supply sys., clearing, grubbing, spillway, stilling basin, piling, dam, artificial lake, etc. $35,000. Henningson Eng. Co., Standard Oil Bldg., Omaha, Neb., engrs. CD 7/22—ENR 7/24.

LOW BIDDERS

Calif., San Francisco—P. Utilities Comn., City Hall, Aug. 5, watermains Stonecrest Subdivision, from Lowrie Paving Co., 1540 16 St., **$36,881.** CD 7/28.

Miss., Coldwater—S. H. Cooper, mayor, Aug. 5, WW addn., from C. H. Cook, Inc., Buena Vista, Ga., **$18,624.** CD 7/30.

Pa., Phila.—Dpt. P. Wks., Bureau Eng., City Hall, July 21, inlet flume at reservoir, from Ed. Fay & Son, 55 and Vine Sts., **$48,400;** watermains, Sched B, from J. N. Driscoll, 132 Apsley St., **$112,698.** CD 7/16.

CONTRACTS AWARDED

†Colo., Fort Logan—Con. Q. M., elevated steel water tank, etc., to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, Ia., **$53,775.**

†Ky., Fort Knox—Con. Q.M., water treatment plant, to E. H. Markoefer, Jr., Co., 222 W. No. Bank St., Chicago, Ill., **$178,858.** CD 6/5—ENR 6/12.

†Md., Silver Springs—Con. Q.M., influent chamber at Washington aqueduct hydroelectric unit, filtration plant, to Leo Butler, Silver Springs, **$55,380.** Awarded 8/6.

†N. Y., Fort Hamilton—Con. Q.M., water, gas and sewage extens. for 62 buildings, to Paino Constr. Corp., 32 Court St., Brooklyn, **$85,000.** CD 7/1—ENR 7/10 under LB.

Pa., Montoursville—Boro Council, 300,000 gal. circular concrete reservoir, to Gannett, Eastman & Fleming, 600 N. 2 St., Harrisburg. Total est. **$25,500.** Bids 8/4. CD 7/21—ENR 7/24.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., Watsonville—Rejected bids July 29, c.i. and vitr. sanitary sewers, appurtenances, $30,000 or more. Will readvertise. CD 7/21—ENR 5/29.

†Colo., Fort Logan—U. S. Eng., 1709 Jackson St., Omaha, Neb., sewage disposal plant, additional sewers. $100,000.

★**Conn., Milford**—Sewage treatment plant exten., Factory Lane, $75,000; pump station, Surf Ave. and E. Broadway, $30,000; 63,000 ft. sanitary sewers, 73 streets, West Shore, $579,000; 7,000 ft., 7 streets, Milford Center, $35,000. Total $719,000. V. B. Clarke, town engr.

Ia., Davenport—H. A. Hass, city clk., sewers, Fairmont St. $26,000.

Ia., Sidney—Sewerage sys., $32,000.

Minn., Wheaton—M. J. Fridgen, village clk., sewage disposal plant. $100,000 or more. WPA.

†Me., Bath—Federal Works Agency, 7 and D Sts. S.W., Wash., D. C., revisions, exten. sewerage sys., Housing Development. $160,000. Whitman & Howard, 89 Broad St., Boston, Mass., engrs.

†Me., Kittery—Pub. Works Officer, Navy Yard, Portsmouth, impr. sewerage sys., Navy Housing Project. $100,000. Whitman & Howard, 89 Broad St., Boston, Mass., engrs.

Mass., Southbridge — Preliminary studies sewage treatment plant, Greeley & Hansen, 6 N. Michigan St., Chicago, Ill., engrs.

Mont., Cascade—Sewerage sys., $30,000. Bond election planned.

O., Vandalia—C. Senseman, mayor, sewage sys. and sewage treatment plant addns. $152,484. Applied for PWA aid. G. R. Steller, 213 Monterey Ave., Dayton, village engr. Champe, Finkbeiner & Associates, 725 Nicholas Bldg., Toledo, consult. engrs. CD 7/30—ENR 8/7.

Ore., Springfield—Bond election Nov. 4, trunk sewer, sewage disposal plant. $250,000.

Pa., Allentown—G. W. Kistler, city clk., creating Sewer Dist. 29, 16 Ward, installing 30,000 lin. ft. 8 and 10 in. sewers. $90,000. E. Meckley, city engr.

Pa., Beaver—Bd. Comrs. Borough Twp., Rev., J. C. Steel, secy., Vanport, made plans sanitary sewers, WW and pump. roads. Borough Twp., near here. $260,000. PWA. M. Baker, Jr., Penn Beaver Hotel, Rochester, co. engr. Chester Engineers, 210 E. Parkway, NS Pittsburgh, engrs.

Pa., Jersey Shore—Boro Council, sanitary by-pass down Pine Creek to old Penna Canal, etc. $63,015. Bond election in November.

Tenn., Humboldt—Mayor, exten. sewerage sys., $25,000.

Tenn., Chattanooga—T. H. McMillan, city comr., sewerage plant, imprv. sanitary sewerage sys.

Texas—State Hy. Comn., B. P. Gentry, chn., Austin, bids soon drainage structures 0.347 mi. U. S. 90, Gonzales Co.; Dry Devils River Bridge, and relief bridge, 0.075 mi. U.S. Hy. 277, Edwards Co.; Stark's Creek bridge, approaches, 0.584 mi. Hy. U. S. 290, Kimble Co., Ft. Fort Worth and Denver City R.R. underpass, approaches, 0.567 mi. Hy. U.S. 287 and State 18, Donley Co.

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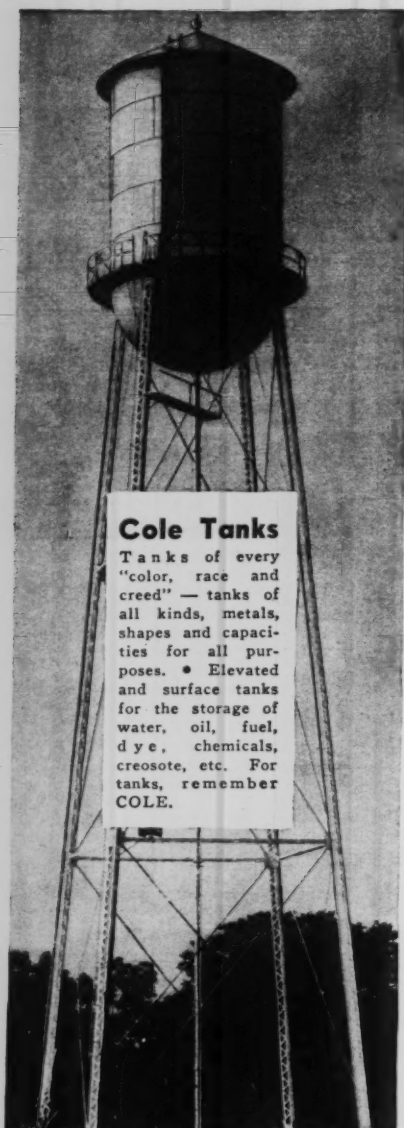

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SEWERS, etc. (Proposed Work, Cont'd.)

Tex., Beaumont—Lamar Union Junior College of Jefferson Co., c/o J. E. Gray, dir. drainage sys. clearing, filling, catch basins, manholes, etc., near here. $61,500. Applied for PWA funds. Stone & Pitts and W. B. Livesay, 1200 Goodhue Bldg., archts. C. A. Kohler, Goodhue Bldg., engr.

★**Tex., Corpus Christi**—A. C. McGaughan, mayor, sewerage sys. imprvs. $750,000. Applied for for PWA funds. Meyers & Noyes, Corpus Christi, engrs. CD 5/12—ENR 5/15.

Tex., Grand Prairie—Voted bonds, disposal plant, collecting lines. $35,000.

Wash., Cathlamet—Bids soon new water sys. $30,000.

BIDS ASKED

Bids Asked August 21

Ill., Chicago—Sanitary Dist. of Chicago, 910 S. Michigan Ave., Div. Q West-Southwest Sewage Treatment Works. Extended date; CD 7/22—ENR 7/24.

Bids Asked September 3

†**Md., Annapolis**—Yards & Docks, Navy Dpt., Wash., D. C., imprv., exten. water treatment plant, Spec. 10488.

LOW BIDDERS

Calif., Alameda—City Council, July 29, sewage pump. plant, from Engineer's Ltd., Standard Oil Bldg., San Francisco, **$25,648.** CD 7/23.

†**Calif., Hamilton Field**—U. S. Eng., 401 Customhouse, San Francisco, July 31, sewage treatment plant, from F. J. Early, Jr., 369 Pine St., San Francisco, **$99,784.** Est. $74,305. CD 7/28.

N. Y., Kew Gardens—President Queens Boro, Queens Boro Hall, 120-55 Queens Blvd., Aug. 7, sewers 91 St., from Millman & Nazzaro, 215 Montague St., Brooklyn, **$57,435;** automatic pump. sta. Alley Park from Oakhill Contg. Co., Inc., 74-20 Caldwell Ave., Maspeth, **$234,550.** CD 7/29—ENR 7/31.

★**Ont., Toronto**—Chn. Bd. Control, July 29, 1st stage sewage disposal plant, Fisherman's Island, sedimentation tanks, sludge beds, retaining walls from Rayner Constr. Ltd., 29 Commercial St., Leaside, **$1,662,877.** CD 7/1—ENR 8/10.

CONTRACTS AWARDED

Conn., Southington—Boro, Bd. Selectmen, Town Hall, lateral sewers, Old Turnpike Rd., Southington, and Burwell Aves., connecting sewer across Holcomb School Yard, sewer in Summit St., to B. M. Y. Constr. Co., 752 Silas Deane Hy., Wethersfield, **$28,000.** C. M. Blair Inc., 100 Crown St., New Haven, engr. CD 7/28—ENR 7/31.

†**Ky., Fort Knox**—Con. Q.M., sewage treatment plant, to W. L. Hailey & Co., Cotton States Bldg., Nashville, Tenn. **$294,250.** Bids 6/10. CD 6/6—ENR 6/12.

Pa., Phila.—Dpt. P. Wks., Bureau Eng., City Hall Annex, sewers, Claridge St., to A. Disandro, N. 25 St., **$38,331*****Montour St., to P. Ventresca, Grange Ave., **$33,800*****main gravity collector at sewage disposal plant, to Acchione Constr. Co., McKean St.

†**Tex., San Antonio**—Con. Q. M., Fort Sam Houston, sewer lines, etc., to W. J. Aldrich, Builders Exch. Bldg., **$29,241.** CD 6/2—ENR 6/5.

†**Tex., San Antonio**—Con. Q.M., Fort Sam Houston, sewage outfall sys., etc., to E. L. Dalton & Co., Great Natl. Life Bldg., Dallas. **$36,545.**

Tex., San Antonio—Bexar Co., c/o judge, Court House, eliminating unsanitary devices, installing sewage lines, sanitary provisions, certain dists. **WPA. $76,372.**

Utah, Provo—City Clk., imprv., exten. sewer and water sys., also imprv. streets. **WPA. $174,714.** E. Jacobs, city engr.

Alta., Suffield—Dpt. National Defense, Ottawa, Ont., installing sewerage sys. at Field Experimental Station, to Nelson River Constr. Co. Ltd., Union Trust Bldg., Winnipeg, Man., **$40,000.**

Ont., Petawawa—Dpt. National Defense, Ottawa, sewage disposal plant, military camp, to McLaughlin Brothers, Ltd., 129 Scott St., Ottawa, **$50,000.**

Ont., Timmins—Laying sewers and watermains, to Caswell Constr. Ltd., South Porcupine. About **$40,000.** J. D. McLean, Town Hall, engr.

BRIDGES, GRADE CROSSINGS

PROPOSED WORK

★**New Jersey**—State Hy. Dpt., E. D. Sterner, comr., Trenton, bridge over Passaic River between Essex and Hudson Counties. $1,000,000.

N. Y., New York—President Bronx Boro, 851 Grand Concourse, foot bridge from 132 St. over Bronx Kills to Randalls Island. $120,000.

North Dakota—State Hy. Dpt., Bismark, rejected bids Aug. 8, 1.054 mi. underpass and approach SH 14, Towner, McHenry Co. CD 7/29—ENR 7/31.

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BRIDGES, etc. (Proposed Work, Cont'd.)

Okla., Ninnekah—Hy. Dpt., Oklahoma City, bridge over Little Washita River, US 277, near here, Grady Co. $35,000. V. T. Moon, 2227 NW 20 St., Oklahoma City, engr.

Okla., Tupelo—Hy. Dpt., Oklahoma City, overpass over K. O. & G. Ry. tracks, Pontotoc Co. $45,000. V. T. Moon, 2227 NW 20 St., Oklahoma City, engr.

BIDS ASKED

Bids Asked August 19

Maryland—State Roads Comn., Baltimore, railroad grade separation, approaches, Contr. AA 198-1-344 and Ho 199-1-34, Anne Arundel and Howard Counties; reconstructing floor of bascule span, constructing sidewalk on all spans existing bridge over Pocomoke River at Pocomo, Contr. S-117-1-111, Somerset Co.

Bids Asked August 20

Mich., Charlevoix—State Hy. Dpt., Lansing, bridge, approaches, FB1 of 15-4-1C-3, US 31.

Bids Asked August 21

Conn., Hamden (br. New Haven) — Bd. Selectmen, Town Hall, demolish old structure, build new and wider rein.-con. construction over railroad, Mather St. $25,000.

Florida—State Road Dpt., Tallahassee, T. A. Johnson, chn., bituminous retread surfacing 4.471 mi. Caloosahatchee River Bridge Rd. 5, S.P. 769 (2), Lee Co.; 2.88 mi. Rd. 73, S.P. 985 (2) Pinellas Co.

Bids Asked August 22

Kansas—State Hy. Dpt. Council Grove, Bridge Sts., 24 plus 21.5, FAS 72 A, cont. beam span, Morris Co., bridge 1, FAS 113 A, RC slab span, Clay Co.

Kansas—State Hy. Dpt., Osawatomie, grading, culverts 4.815 mi. FA 570 B, Cherokee and Crawford Counties. R. B. Wills, 1255 Plass St., engr.

Minnesota—State Hy. Dpt., St. Paul, Bridge 5891, S.P. 2752-0 Trunk Hy. 55-188, FAGM 577 C(1) (ON) Golden Valley Twp., Hennepin Co. Over $25,000. E. J. Miller, St. Paul, bridge engr.

Bids Asked August 27

Kansas—State Hy. Dpt., Osawatomic, bridge 10.9, FA 293 A, Pt. 2, cont. I-beam span; Bridge 10.4, FA 293 A, Pt. 2, cont. flat span; Bridge 10.1, FA 293, A, Pt. 1, cont. plate girder span, all Miami Co.; Bridge 10.4 FA 570 C, cont. steel beam span, bridge 12.4, FA 570 C, Cont. RC slab span, Bridge 12.9, FA 570 C, cont. RC slab span, Bridge 6.3 FA 570 B, R slab span, Bridge .1, FA 570 B, cont. steel beam span, Bridge 5.7, FA 570 B, RC slab span, Bridge 4.9, FA 570 B, RFRC span, Bridge 5, FA 570 B, steel beam span, bridge 7.7 FA 570 B, RC box, all Cherokee and Crawford Counties.

Bids Asked August 28

†**Mississippi**—Public Roads Administration, 219 Old Post Office Bldg., Vicksburg, rein.-con. bridge, approaches, etc., Project 3 N5, Natchez Trace Parkway, Leake Co.; adv. ENR 8/14.

Bids Asked August 29

Minnesota—State Hy. Dpt., St. Paul, grading, constructing gravel lifts, 13 mi. D.2, S.P. 1604 (Trunk Hy. 61); 10.2 mi. D.2, S.P. 3803 (TH 1); 7.3 mi. D.2, S.P. 3803 (TH 1); at dist. office State Hy. Dpt., Detroit Lakes, imprv. 3.1 mi. D.6, S.P. 4405 A.F.E. 28 (TH 113).

Bids Asked September 4

Kan., Kansas City — Wyandotte Co., repairing James St. Bridge over Kaw River, $145,000. Sverdrup & Parcel, Railway Exch. Bldg., St. Louis, Mo., and Mr. Ellerbrook, Court House, co. engrs.

LOW BIDDERS

†**D. C., Wash.**—Public Roads Administration, Winder Bldg., 17 and F St. N.W., Aug. 7, steel struts between abutment of bridge over Bounday Channel at end of Columbia Island, Contr. 5B-6, from Centaur Constr. Co., 11 West 42 St., New York City, **$64,386.**

Indiana—State Hy. Comn., Indianapolis, Aug. 5, bridges over White River, Marion Co. and over Raccoon Creek, Montgomery Co., from B. E. Curry Bldg. Co., Bloomington, **$159,943** and **$63,092** respectively***over Grapevine ditch, St. Joseph Co., from Stuntz-Yoeman Co., Frankfort, **$25,600**, est. $33,213 ***over Little Elkhart River, Elkhart Co., from Reith-Riley Constr. Co., W. Main St., Goshen, **$41,593**, est. $43,877***over Furlick, Little Blue Grass and Big Blue Grass Creeks, Vandetburg Co., from Mulzer Constr. Co., Martinsville, **$53,975**, est. $66,073***over Blue River, Washington Co., from G. R. Harvey, Danville, **$73,881**, est. $76,733***over Sly Fork and Montgomery Creeks, Henry Co., from De Bolt Constr. Co., Inc., Richmond, **$29,274**, est. $34,947. CD 7/22—ENR 7/24.

Me., Fairfield—State Hy. Comm., L. D. Barrows, ch. engr., Augusta, Wyman Crossing under tracks Maine Central R.R., from Briggs & Grenci Constr. Co., 440 E. 41 St., New York, $203,975.

Minnesota—State Hy. Dpt., St. Paul, Aug. 1, imprv. 10.8 mi. S.P. 4304-01, FAS 131 A(1), from DeRuyter Bros., Willmar, **$89,728*** 10.6 mi. S.P. 8210-05 and S.P. 1305-01 and 02, FAP 474 B(1) and 474 C(2), from E. A. Studer & Sons, Excelsior, **$194,641***7.5 mi. S.P. 4402-03, from Haggart Constr. Co., Fargo, N. D., **$41,494***0.5 mi. S.P. 0203-06 and S.P. 0202-12, S.N.-FAP 16 (4), from Fielding & Shepley, 1258 Bohn St., St. Paul, **$41,952*** 4.3 mi. Proj. 53-501-04, FAP 602 A(2), Nobles Co., from J. Brown and Lundin Bros., Mankato, **$44,957.** CD 7/16—ENR 7/24.

New York—A. W. Brandt, supt. P. Wks., Albany, Aug. 6, Long Island R. R. grade crossing elimination, Nassau Co., from Andrew Weston, Inc., 158 Irving Pl., Woodmere, **$123,657**, est. $148,338***bridge, 0.25 mi. Seneca Co., from V. J. Costanzi, Inc., 3 Brooks Ave., Poughkeepsie, **$30,960**, est. $35,100***bridge, 0.08 mi. Rensselaer Co., from V. De Guilio, Albany, **$29,692**, est. $33,312. CD 7/16—ENR 7/24 under Roads.

Wis., Racine—H. A. Nelson, comr. P. Wks., July 29, repairing W. 6 St. viaduct, pavements, walks, etc. from Durite Co., 9 S. Clinton St., Chicago, Ill., **$59,745.** CD 7/22—ENR 7/17.

CONTRACTS AWARDED

†**Calif., San Miguel**—Con. Q. M., San Miguel, underpass, Camp Roberts, to F. C. Stolte, Pacific Grove, **$37,090.**

Georgia—State Hy. Dpt., Atlanta, 4 bridges on Abbeville-Cordelle Hy., Wilcox Co., to D. Scott & Co., Decatur, **$45,207.** Bids 7/25. CD 7/18.

Kansas—State Hy. Dpt., at office Co. Clk., Ulysses, 1,000 ft. bridge reconstruction, Grant Co., to D. G. Hansen, Logan. **$61,147.** Bids 7/29, awarded 8/4. CD 7/15—ENR 7/17.

N. J., Mt. Holly—Bd. Freeholders Burlington Co., bridge on Marne Hy., near here, to Frank J. Hill, 132 Hulme St., **$38,000.**

Pa., Pittsburgh—Allegheny Co., R. G. Woodside, controller, Court House, bridge reconstruction Bridge 1, McLaughlin Run, Bridgeville, to Kean, 4923 Rosetta St., Pittsburgh, **$44,460.**

Pa., Ross (Twp. Mail Bellevue)—Bd. Comrs. Ross Twp., W. Winner, secy., Glen Vue Dr., 2½ mi. rein.-con. sanitary sewers, to Kelly Constr. Co., 7337 Kelly St., Pittsburgh. **$72,000.** CD 5/21—ENR 5/29.

★**South Carolina**—South Carolina Pub. Serv. Auth., at office Harza Eng. Co., engr., 27 Cumberland St., Charleston, Atlantic Coast Line Railroad bridge over tailrace Santee-Cooper Project, Berkeley Co., to Virginia Bridge Co., P. O. Drawer 2201, Roanoke, **$547,840.** CD 7/23—ENR 7/31 under LB.

STREETS AND ROADS

BIDS ASKED

Bids Asked August 18

†**Tex., Brownwood**—Con. Q.M., Camp Bowie, constructing, reconstructing 50 mi. county roads, in vicinity Camp Bowie, Brown and Mills Counties; adv. ENR 8/14.

Bids Asked August 19

Maryland—State Roads Comn., Baltimore, grading, drainage, surfacing 0.509 mi. cloverleaf or grade separation project. Contr. B-440-3-460, Baltimore Co.

Minn., Owatonna—L. Winship, aud. Steele Co., gravel resurfacing 12.2 mi. State Aid Rd. 6. Over $25,000. R. W. Hosfield, co. hy. engr.

Ohio—State Hy. Dpt., Columbus, drainage structures, asphaltic concrete widening and resurfacing, 4.767 mi. Sects. E and I, SH 7, US 52, Clermont Co., $65,100; 7.677 mi. Sect. Grafton, SH 314 and Sect. Oberlin, SH 586, Lorain Co., $34,500; concrete slab top culvert, Hancock Co., $2,700.

Ohio—State Hy. Dpt., Columbus, roadside imprv. 7.116 mi. Sect. J of SH 1, US 40, Franklin Co., $15,400; grading, rein.-con. paving 0.937 mi. and continuous con. slab bridge, Sect. B-2 of SH 337, Knox Co., $18,100; grading, drainage structures, asphaltic concrete widening and resurfacing 5.371 mi. Sect. C and Lima of SH 659, Allen Co., $115,700; 0.635 mi. Sect. Waynesville, SH 6, US 42, Warren Co., $9,220; asphaltic concrete resurfacing 0.56 mi. Sect. Ashland of SH 139, 140, 142, Ashland Co. $12,425; bituminous treatment 8.62 mi. Sects. A, B of SH 154, Ashtabula Co., $7,554; 28.77 mi. sections of SH 255, 944, 6, 251 and 948, Clermont, Clinton and Warren Counties, $43,075; 3.33 mi. Sect. H-2 and G-2 of SH 536, Stark Co., $6,353; bituminous premixed surface course widening and resurfacing 4.16 mi. Sect. N, Rock Creek of SH 753, Ashtabula Co., $42,700; grading, drainage structures, bituminous surface treated waterbound macadam, widening and paving 5.17 mi., Sect. New Riegel and C in Seneca Co., Sect. D in Wyandot Co., on SH 915, Seneca and Wyandot Counties, $105,900.

Bids Asked August 20

N. Y., Brooklyn—President Brooklyn Boro, Boro Hall, repaving Crystal, Dean, Dodworth, Ellery, Moffat and Warwick Sts., Fountain and Hopkinson Aves.; paving Stryker Ct., Southgate Ct. and W. 1 St.

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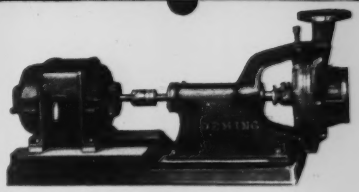

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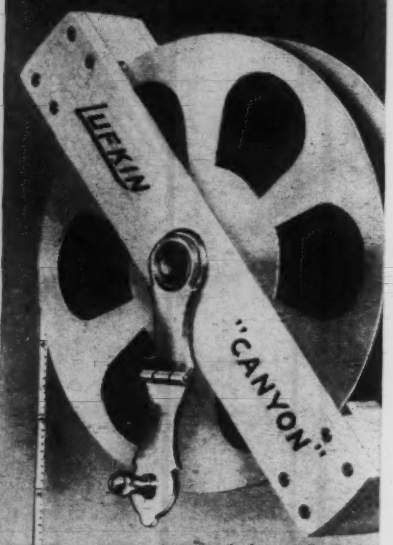

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STREETS, etc. (Bids Asked, Cont'd.)

N. Y., Kew Gardens — President Queens Boro, Queens Boro Hall, 120-55 Queens Blvd., grading, regrading, etc., 69 St., in connecting hy. 30 Ave. 59 48 St., 49 St., etc.

Bids Asked August 21

†**Arizona**—Pub. Roads Administration, San Francisco, Calif., grading, draining, crushed cinder base course 12.95 mi. Snowflake-Pinetop Natl. Forest Hy., Navajo Co.

Florida—State Road Dpt., Tallahassee, T. A. Johnson, chn., reworking, widening rock base surface treated pavement 5 mi. Rd. 8, S.P. 5632 (3) and 5633 (2), Highlands Co.; bituminous surface treating 12.57 mi. Rd. 35, Work Order 0135 (S.P. 623 (2), Madison Co.; 4.582 mi. Work Order 0239 (S.P. 715 (2), Rd. 28, Union Co.; 2.7 mi. Work Order 0572 (S.P. 884 (2), Rd. 3, Duval Co. J. H. Dowling, Tallahassee, state hy. engr.

†**Tex., Mineral Wells** — Con. Q.M., Camp Wolters, constructing, completing 1.5 mi. essential roads; adv. ENR 8/14.

Wash., Spokane—Paving Green St. connection. $26,550. A. D. Butler, city engr.

Bids Asked August 22

Alabama — State Hy. Dpt., Montgomery, grading, drainage, surface treatment, bridges, removal structures 11.791 mi. Heflin-Lineville Rd., Cleburne Co.; grading, drainage, chert surface, bridges, removal structures 4.781 mi. Collinsville-Crossville Rd., DeKalb Co.; bridge approaches 0.302 mi. Montgomery-Birmingham Rd., Jefferson Co.

Kansas — State Hy. Dpt., Council Grove, grading 0.677 mi. FAS 72 A, Morris Co.; 0.356 mi. FAS 113 A, asphaltic surface treatment 6.403 mi. FAS 153 A, both Clay Co.

Minnesota—State Hy. Dpt., St. Paul, grading, concrete paving 10.9 mi. S.P. 0116-13 (Trunk Hy. 169-35) FA Proj. 404 C(5); grading 2.8 mi. S.P. 2203-05 (TH 22-87); grading, stabilized gravel surfacing 3 mi. S.P. 5619-02 (TH 78-180); gravel surfacing, 11 box culvert extensions 6.1 mi. S.P. 4704-05 (TH 12-10) FAP 210 (3); binder soil and gravel surfacing 6 mi. S.P. 7805-10 (TH 75-6) S.P. 7806-01 (TH 75-6) and S.P. 7803-01 (TH 27-10), SN-FAP 343 D(2) and 164 (5); bituminous surfacing, stabilized base surfacing 0.5 mi. S.P. 7305-15 (TH 23-23); cable guard rail, corrugated metal flume S.P. 1921-14 (TH 218-115) S.P. 1907-08 (TH 52-116) and S.P. 1909-11 (TH 55-116); 3 box culverts S.P. 2203-06 (TH 22-87); grading 8.3 mi. State Rd. 5, P. 24-502-01, FAS 100 A(1), Freeborn Co.; 7.7 mi. State Rds. 4 and 9, Proj. 59-502-01, FAS 113 B(1), Pipestone Co.; 2 mi. Rd. 2, P. 81-5021-01, FAS A 1, Waseca Co.; 2.9 mi. State Rd. 11, P. 85-504-01, FAS 180 A(1), Winona Co.; 11 box culverts, 228 cu. yd. concrete Rds. 4 and 9, P. 59-502-02, FAS 113 B(1), Pipestone Co. J. T. Ellisen, c/o owner, ch. engr.

Pennsylvania—At office I. L. Hughes, secy. Hys., Harrisburg, bituminous on native stone, type A or crushed aggregate surfacing 4,607 ft. Legislative Route 123, Sect. 1, Traffic Rte. 15, Camp Hill and Lemoyne Boros, lower Allen Twp., Cumberland Co.; rein.-con. paving, rein.-con. bridge, bituminous surfacing approaches, etc., 7,187 ft. Legislative Routes 112, 113, Sect. 2-W, Traffic Routes 21 and 40, Fayette Co.; native stone or crushed aggregate base widening, bituminous surfacing, exten. 5 structures 47,799 ft. Legislative Route 228, Sects. R-7, A and B, Traffic Route 80, Indiana Co.; bituminous on concrete surfacing 4,750 ft. Legislative Route 35055, Sect. 3, Lackawanna Co.; crushed aggregate base widening, surfacing existing pavement and/or new base with bituminous surface exten. structure 9,485 ft. Legislative Route 161, Sect. 12, Traffic Route 122, Schuylkill Co.; concrete widening, paving, bituminous surfacing, etc., 3,872 ft. Legislative Route 222, Sect. 5, Traffic Route 56, Cambria Co.; bituminous resurfacing, widening, etc. 3,117 ft. Legislative Route 43, Sect. 2, Traffic Route 30, Adams Co.; native stone or crushed aggregate base, bituminous surfacing, rein.-con. bridge 650 ft. Legislative Route 62016, Washington Co. T. C. Frame, c/o owner, ch. engr.

Bids Asked August 26

★**Ontario** — R. M. Smith, deputy minister hys., Toronto, concrete paving 7 mi. Beaverton-Brechin Rd.; 4 mi. Vankleek Hill South; 8 mi. Corunna-Sombra Rd.; 6 mi. Wellandport-Beckett's Bridge Rd.; 5 mi. Durham-Allan Park Rd.; 8 mi. Vernon Rd. N.; 3.5 mi. Malton (Airport) to Browns Line (incl. new grading); concrete paving and mixed macadam paving 9 mi. Brantford-Burford Rd. $800,000-$900,000.

Bids Asked August 27

California—C. H. Purcell, Eng. State Hy. Dpt., Sacramento, grading 1.2 mi. Fresno Co.; grading, plant mix surfacing 0.7 mi. Placer Co.

Kansas—State Hy. Dpt., Osawatomie, grading 3.035 mi. FA 293 A-P 1, 2; concrete paving 3.035 mi. FA 293 A-P 1, 2; 0.616 mi. surfacing for detours, FA 293 A-P 2, all Miami Co.; grading, culverts 4.913 mi. FA 570 C, Cherokee and Crawford Counties.

Louisiana—Dpt. Hys., W. Prescott Foster, dir., New Orleans, grading, washed gravel surfacing 7.05 mi. Routes 269 and 976, Red Cross-McCrea Hy., S.P. 222-02-01 and 223-01-02, Pointe Coupee Parish.

● Toe Trench—Franklin Falls Dam, New Hampshire

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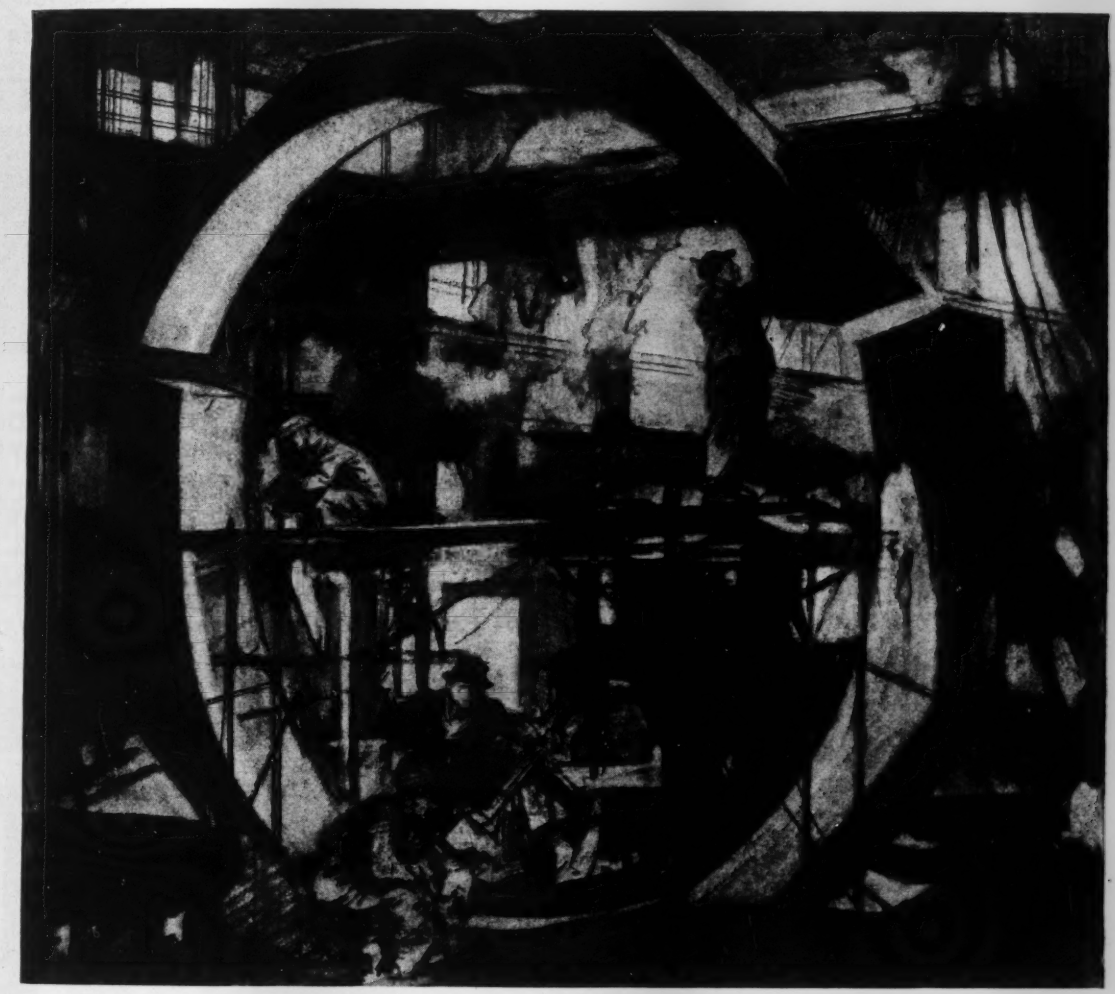

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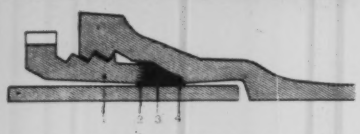

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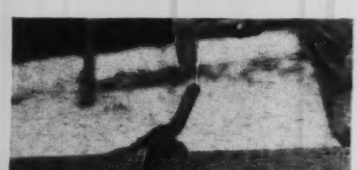
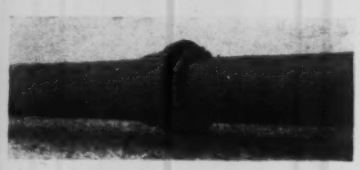
Mono-Cast Centrifugal Screw-Gland Pipe is an all-purpose, economical, mechanical joint pipe suitable for water, gas, oil and other fluids. It is cast centrifugally in sand-lined refractory molds to possess the recognized superior strength properties inherent to all Mono-Cast Pipe, and is equipped with the Screw-Gland Joint which is identical in basic principle to the well-known Doublex Simplex Joint except that the gasket is compressed by a screwed gland instead of by bolts. Furnished in sizes 3" to 12" inclusive, with a full line of fittings. Write for detailed literature.

Force gasket into socket by hand punches, using caulking iron or small bar.



Screw up gland by hand and then tighten with spanner wrench by striking wrench handle with hammer.



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STREETS (Bids Asked, Cont'd.)

New York—A. W. Brandt, supt. P. Wks., State Office Bldg., Albany, imprv. hys. bridges, Cortland, Delaware, Essex, Clinton, Jefferson, Madison, Oneida, Steuben and Chenango Counties; adv. ENR 8/14.

Bids Asked

California—C. H. Purcell, engr. State Hy. Dpt., Sacramento, rejected bids July 23, imprv. 6.3 mi. hy., Sonoma and Napa Counties. CD 7/29—ENR 7/31 under LB.

California—C. H. Purcell, engr. State Hy. Dpt., Sacramento, rejected bids July 30, imprv. 24 mi. hy. Modoc Co. CD 8/6 under LB—ENR 7/17 under BA.

Kansas — State Hy. Dpt., Stockton, rejected bids July 25, light type surfacing 0.755 mi. FA 340 F-B1, 2; 2.865 mi. FA 565 B1, 2, both Rooks Co.; asphaltic surface treatment 14.024 mi. K 3670 AB; 27.11 mi. K 3671 ABCD, both Wallace Co.

Minnesota—State Hy. Dpt., St. Paul, rejected bids 7/ ., imprv. 4.9 mi. State Rd. 6, Fed. Secondar Aid Proj. 72-501-04, FAS 73 A(2), Sibley Co. CD 8/6, under LB—ENR 7/17, under BA.

Maryland—State Roads Comn., Baltimore, rejected bids July 22, imprv. 0.44 mi. Contr. M-360-1-311, Montgomery Co. CD 7/28—ENR 7/31, under LB.

North Carolina—State Hy. & P. Wks. Comn., Raleigh, rejected bids July 29, imprv. 2.94 mi. P 3646, Onslow Co. Will readvertise. W. V. Baise, Raleigh, engr. CD 7/18—ENR 7/24.

LOW BIDDERS

Arizona—State Hy. Com., Phoenix, Aug. 7, grading drainage, aggregate base course, 9½ mi. Benson-Stens Pass Hy., SN-FA 137-C (1) (1942), from Lee Moor Contr. Co., 807 Bassett Tower, El Paso, Texas. **$234,891.** W. R. Hutchins, Phoenix, engr.

Arizona—State Hy. Dpt., Phoenix, Aug. 1, imprv. 2.8 mi. Ashford-Flagstaff Hy., from Arizona Sand & Rock Co., P. O. Box 1522, Phoenix, **$165,269.** CD 7/22—ENR 7/24.

†**California**—Public Roads Administration, Federal Office Bldg., San Francisco, bituminous surface treating 29.557 mi. Sects. A and B, Route 11, and Sect. B (portion. Route 12, Modoc National Forest, Modoc Co., from Fredericksen & Westbrook, 212-13 St., Sacramento. **$335,393.** Bids 8/5—CD 7/15—ENR 7/24.

California—C. H. Purcell, engr. State Hy. Dpt., Sacramento, July 30, imprv. 2.6 mi. Santa Clara Co. from Piazza Huntley, 195 N. 6 St., San Jose, **$26,412.** CD 7/17.

Delaware—State Hy. Dpt., F. V. DuPont, chn., Dover, July 30, imprv. 1.101 mi. Contr. 675, and 6.146 mi. Contr. 768, New Castle Co., from Wilson Contg. Co., State Road, **$28,844** and **$125,707** respectively. CD 7/8—ENR 7/10.

Florida—State Road Dpt., Tallahassee, July 31, imprv. 3.725 mi. Jackson Co., from C. C. Moore Constr. Co., Panama City. **$367,227.** CD 7/22—ENR 7/24.

Illinois—State Dpt. P. Wks. & Bldgs., Div. Hys., Springfield, Aug. 8, patching 0.1 mi. Sec. PV-1, Cook Co., from Reschke Const. Co., Winnetka, **$28,738*****imprv. 1.74 mi. Sect. 2024 R, Cook Co., from Peter J. Crowley Co., Maywood, **$124,452*****0.15 mi. La Salle Co., from Trompeter Constr. Co., Peru, **$48,928***** 0.9 mi. Lee and Ogle Counties, from Scheflow & Monahan, Glen Ellyn, **$59,614.** CD 8/5.

★**Indiana**—State Hy. Comn., Indianapolis, Aug. 5, imprv. 5.946 mi., Kosciusko and Elkhart Counties and 1.918 mi. Miami Co., from Gast Constr. Co., Warsaw, **$294,792** and **$96,592** respectively, est. $328,640 and $106,828 respectively***4.875 mi. St. Joseph Co. and 2.273 mi. Tippecanoe Co., from Bontrager Constr. Co., Elkhart, **$443,606** and **$426,014** respectively, est. $468,272 and $439,189 respectively***1.328 mi. Dearborn Co., from Seevers & Karsteter, Lawrenceburg, **$65,515,** est. $73,748***0.768 mi. Crawford Co., from N. E. Dougherty, Bloomington, **$61,881,** est. $65,427***0.463 mi. Vanderburg Co., from Feigel Constr. Co., 411 Grein Bldg., Evansville, **$393,083,** est. $398,030***0.583 mi. Decatur Co., from L. P. Cavett Co., Shepard St., Lockland, O., **$31,996,** est. $32,053. State Hy. Comn. rejected bids Aug. 5, imprv. 8.907 mi. Vigo and Clay Counties; 3.323 mi. Marion Co.; 11.166 mi. Clark Co., wi'l readvertise. CD 7/22—ENR 7/24.

Louisiana—Dpt. Hys., Baton Rouge, Aug. 6, imprv. 13.8 mi. Webster Parish, from Barber Bros. Contg. Co. Reymond Bldg., Baton Rouge, **152,723.** CD 7/14—ENR 7/17.

Mich., Bay City—Bay Co. Rd. Comn., Bay County Bldg., July 25, imprv. 3.972 mi. road Kawkawlin and Fraser Twps., from Bridgeport Core Sand Co., 125 Davenport St., Saginaw, **$45,725.** CD 7/17.

Minnesota—State Hy. Dpt., St. Paul, July 25, imprv. 7.7 mi. S.P. 1203-02 and S.P. 3401-01, from J. P. Berghuis, Clara City, **$49,484***** 13.2 mi. S.P. 6607-12 and 13, and S.P. 2511-02, and 03, 1001-06, from Megarry Bros., St. Cloud,

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STREETS (Low Bidders, Cont'd.)

$77,437*7.2 mi. P. 34-505-02, Kandiyohi Co., from Duininck Bros., Olivia, **$35,787.** CD 7/7—ENR 7/17.

Nev., Reno—Curbs, gutters, alley paving, etc., from A. Bevilaqua, 505 Montello St. **$67,990.** Bids 7/28. CD 7/21.

New Hampshire—State Hy. Dpt., Concord, Aug. 7, 3 in. road mix on gravel surfacing 1.483 mi. Merrimack Co., from Littleton Constr. Co., Littleton. **$139,360.** Est. $112,000. CD 7/24—ENR 7/31.

★**New York**—A. W. Brandt, supt. P. Wks., Albany, Aug. 6, imprv. hy. Suffolk Co., from Andrew Weston Co., Inc., 158 Irving Pl., Woodmere, **$106,056,** est. $108,255***7.39 mi. Allegany Co., from C. P. Ward, Inc., 700 Hollenbeck St., Rochester, **$576,784,** est. $585,262. CD 7/16—ENR 7/24.

†**North Carolina**—Pub. Roads Administration, Winder Bldg., 17 and F Sts. N.W., Wash., D. C., Aug. 7, imprv. 1.83 mi. Project 2F3, Blue Ridge Parkway, Watauga Co., from Gregory & Poole, 336½ Salisburg St., Raleigh. **$186,743.** CD 7/16—ENR 7/24.

Pennsylvania—State Hy. Dpt., I. L. Hughes, secy., Harrisburg, Aug. 8, imprv. 4.989 ft. Luzerne Co., from C. F. Goeringer Constr. Co., 55 S. Washington St., Wilkes-Barre, **$29,412***** 1.187 ft. Forest Co., from Howes & Farrell, Inc., Oneida, N. Y., **$72,611***4.676 ft. Washington Co., from Frank Donatelli & Co., Inc., 7202 Apple St., Pittsburgh, **$93,739.** State Hy. Dpt., Harrisburg, received no bids 8/8, imprv. 2.340 ft. hy. Allegheny Co.; 1.477 ft. Mercer Co., will readvertise. CD 7/29—ENR 7/31.

Tennessee—State Hy. Dpt., Nashville, Aug. 1, imprv. 2.42 mi. Putnam Co., from Marion Constr. Co., Nashville, **$109,142***2.449 mi. Overton Co., from B. G. Young, Jonesboro, **$40,966***13.336 mi. Hardeman Co., from Hagen Constr. Co., Manchester, **$80,813.** CD 7/15—ENR 7/17.

Tex., Corpus Christi—A. C. McCaughan, mayor, paving Buffalo St., from Brown & Root, 412 Fannin St., Austin, **$121,505.** Est. $135,000.

†**Utah, Ogden**—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., Aug. 2, streets, sidewalks, Hill Field, from Strong & Grant, Springville, **$409,513.** CD 7/29.

Virginia—Dpt. Hys., Aug. 7, imprv. 3.47 mi. hy. Warwick Co., from Hechler Bros., Highland Springs, **$91,905***1.8 mi. Henrico Co., from R. K. Williams, 104 Hillcrest Ave. W., Richmond, **$83,285***2.7 mi., Pittsylvania Co., from E. C. Bramham Constr. Co. and M. C. Turner, Halifax, **$89,689.** CD 7/25—ENR 7/31.

Washington—R. C. Knapp, dir. State Hy. Dpt., Olympia, July 29, imprv. 2.008 mi. King Co., from Fiorito Bros., 1100 Leary Way, Seattle. **$274,419.**

CONTRACTS AWARDED

Ark., Jonesboro—C. Freeze, judge Craighead Co., imprv. roads, **WPA. $203,016.**

Ark., Sheridan—J. R. Matthews, judge Grant Co., road work, **WPA. $72,972.**

†**California**—Con. Q.M., Fort Mason, San Francisco, paving, sidewalks at Forts Cronkite, Funston and Miley, Inv. W-6616-42-7, from A. A. Tieslau, 2819 Telegraph Ave., Berkeley, **$33,450.** CD 7/29—ENR 7/31.

†**Calif., Fort Ord**—Con. Q.M., Fort Ord, 40,000 sq. yd. paving and sidewalks, to F. J. Twaits and Morrison-Knudsen, 816 West 5 St., Los Angeles. **$133,169.**

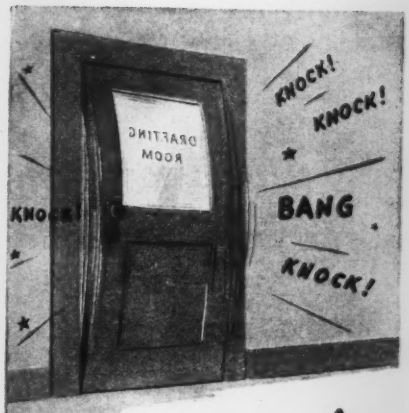
Calif., Hanford—Supervs. Kings Co., widening, resurfacing, 14 and Excelsior Aves., to Brown, Doko & Baun, Pismo Beach. **$73,654.** CD 7/28—ENR 7/31.

Calif., San Jose—Supervs. Santa Clara Co., realignment, imprv. 2,700 ft. Permanente Rds., to A. J. Raisch, 900 W. San Carlos St., **$25,645.** Bids 8/4—CD 7/28.

Florida—State Road Dpt., Tallahassee, imprv. S.P. 5269, Jackson Co., to M. C. Caddell, 2014 Dennis St., Jacksonville, **$28,048*** S.P. 5101 (3), Rd. 26, Broward Co., to E. A. Pynchon, 12716 Griffing Blvd., North Miami, **$254,813***S.P. 5209 (2) Rd. 8, Polk Co., to John E. Ballenger Constr. Co., Lakeland, **$161,720***S.P. 5468 (3), Rd. 166, Holmes Co., to R. B. Tyler Co., 1446 Levering St., Louisville, Ky., **$28,784***S.P. 5122 (3) and 5297 (2), Rds. 62 and 265, Santa Rosa Co., to C. C. Moore Constr. Co., Panama City, **$26,397.** Grand total, $499,762. Bids 7/31, awarded 8/4. CD 7/22—ENR 7/24.

Georgia—State Hy. Dpt., Atlanta, surfacing 3.104 mi. road, 2 bridges, Mitchell Co., to L. T. Barber, Moultrie. **$53,997** est. $42,000; surfacing 8.804 mi. Lamar and Upson Counties, to R. H. Wright & Son, Columbus, **$65,574** est. $44,000. Bids 7/25 State Hy. Dpt., Atlanta, withdrew from 7/25 opening imprv. 40.913 mi. hy. from Florida line to Brunswick, Ga. and resurfacing 15.983 mi. same hy. from Brunswick to Darien. CD 7/11—ENR 7/14.

†**Ga., Hinesville**—Con. Q.M., Camp Stewart, additional access roads, to W. C. Shepherd, 545 Piedmont Ave. N.E., Atlanta, Ga. **$59,109.**



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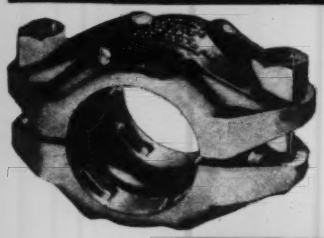

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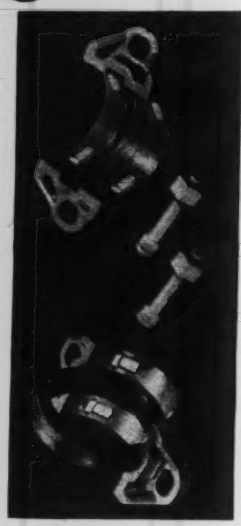

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STREETS, etc. (Contracts Awarded, Cont'd.)

Idaho—A. C. Merritt, comr. P. Wks., Boise, imprv. 18.044 mi. Lemhi Hy., FAP 230-C(1), to Nick Burgraff, Inc., Idaho Falls, **$58,173.** Bids 8/1. CD 7/24.

Idaho, Pocatello—Bannock Co., imprv., reconstructing roads, **WPA. $352,301.**

Kansas—State Hy. Dpt. at office Co. Clk., Stockton, grading 2.365 mi. Rooks Co., to M. Reinhardt, Russell, **$26,563.** Bids 7/25, awarded 8/4. CD 7/15—ENR 7/17.

†La., Alexandria—Con. Q.M., interior roads, Camp Livingston to Barber Bros. Contg. Co., Reymond Bldg., Baton Rouge. **$272,413.** Awarded 7/24.

†La., Alexandria—Con. Q.M., Camp Livingston, roads, to Gregory & Hogan, Little Rock. **$84,073.** Awarded 8/7.

†La., Alexandria—Con. Q.M., additional camp roads, Camp Claiborne, to Roy M. Lilly, Louisiana Natl. Bank Bldg., Baton Rouge. **$162,551.** Bids 6/30, awarded 7/30.

†La., Camp Livingston—Con. Q.M., resurfacing entrance highway, to J. A. Gregory and Ben M. Hogan, 115 N. Spring St., Little Rock, Ark. **$43,107.**

†La., Leesville—Con. Q.M., access roads, to Glassell Taylor Co., Shreveport. **$82,796.** Bids 7/26, awarded 7/30.

Maine—State Hy. Comn., L. D. Barrows, ch. engr., Augusta, gravel surfacing 1.67 mi. Searsport, to J. R. Cianchette, 120 Main St., Pittsfield. **$70,728.** CD 7/23.

†Me., Kittery—Con. Q.M., road, Fort Foster, to Guerini Constr. Co., Mattapan, Mass. **$32,500.**

†Me., Portland—Con. Q.M., Fort Preble, roads, drainage sys., Fort Preble, to W. H. Hinman, North Anson. **$114,532.**

Maryland—State Roads Comn., Baltimore, imprv. 3.71 Contr. M 363-1-311, Montgomery Co., to P. Reddington & Sons, 2 E. Lexington St., Baltimore, **$89,400.** CD 7/22—ENR 7/24.

†Mass., New Bedford—Con. Q.M., Fort Rodman, road and drainage, to Warren Bros., Cambridge. **$31,552.**

†Mich., Detroit—Con. Q.M., bituminous paved parking area, Fort Wayne, to Detroit Concrete Products Corp., 1200 Hubell St. **$30,866.**

Minnesota—State Hy. Dpt., St. Paul, imprv. 6.2 mi. SP 4501-09, to P. C. Roth & Son, Brainerd. **$67,938.** Bids 7/25. CD 7/7—ENR 7/17.

Minnesota—State Hy. Dpt., St. Paul, imprv. 4.7 mi. S.P. 7201-10 (Truck Hy. 5-121) and S.P. 1001-06 TH 5-121, FAP 587 B (2), to McCree & Co., 918 New York Bldg., St. Paul and W. Mueller, Hamburg. **$44,868.** Bids 7/25 rejected. CD 8/6 under LB—ENR 7/17.

Minn., Breckenridge—Ruth Hamilton, city clk., soil cement and blacktop surfacing 36 blocks, to L. C. Byerly, Breckenridge and Sarrington Constr. Corp., Lake Delton, Wis. **$101,424.** Bids 7/7. CD 6/25.

N. Y., Albion—Orleans Co. Hy. Dpt., Albion, general maintenances 209 mi. hy. sys., widening, surfacing 2.5 mi. Albion-Gaines-Kent Rd., 1.25 mi. Hulberton Rd., widening 6½ mi. Smith Rd., 6 mi. Lakeside and 0.25 mi. Fancher Rd., double treatment asphalt surfacing 5½ mi. Clarendon Rd., own forces. **$57,250.** H. D. Waldo, c/o owner, co. supt. hys.

N. Y., Amherst—Reconstructing roads, **WPA.** Over **$50,000.**

N. Y., Saugerties—Widening, reconstructing roads, **WPA.** Over **$50,000.**

North Dakota—State Hy. Dpt., Bismarck, imprv. 18.196 mi. Case and Ransom Counties, to Peter Kiewit Sons Co., 1024 Omaha Natl. Bank Bldg., Omaha, Neb. **$199,954.** Bids 8/8. Rejected bids Aug. 8, roadside imprv. 5.9 mi. and structural imprv. Richland Co. CD 7/29—ENR 7/31.

O., Youngstown—Mahoning Co., resurfacing 25 mi. roads, to Kelley & Meyer Co., Alpine St. **$99,200.** Est. $102,200. Bids 7/25, awarded 7/30. CD 7/8—ENR 7/10.

Okla., Britton—Grading, asphalt surfacing 60 blocks streets, **WPA. $82,560.** H. T. Lawrence, 3244 W. 14 St., Oklahoma City, engr.

Pa., Pittsburgh—Allegheny Co., R. G. Woodside, controller, Lowries Run and Rochester Rd. and Bridge 1, East Branch, road relocation, widening, paving, bridge, to Nardulli & Sons, 937 Butler St. **$57,982.** Bids 7/15. CD 7/30 under LB, ENR 7/4 under BA.

Pa., Pittsburgh—Bd. Comrs. Allegheny Co., R. G. Woodside, controller, Court House, paving Bigelow Blvd. exten., reconstructing boulevard in Point Area, to D. Dinardo, Inc., 333 Bouquet St., **$47,350.** Bids 7/22. CD 7/3—ENR 7/10.

Pa., Pittsburgh—F. M. Roessing, city dir., City County Bldg., repaving, recurbing Smithfield St. and regrading, repaving Reynolds Ave., to Dinardo, Inc., 313 Boquet St., **$57,130** and **$31,752** respectively. J. Croak, City County Bldg., engr.

Pa., Uniontown—Fayette Co., A. Montgomery, controller, Court House, bit. paving, seal coat surfacing, to C. Yoder, 4 Wine St. **$60,385.**

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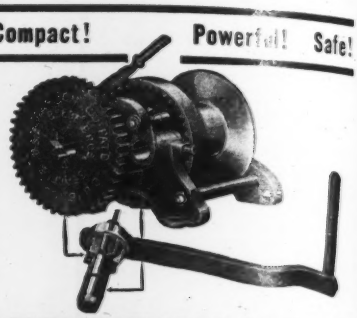

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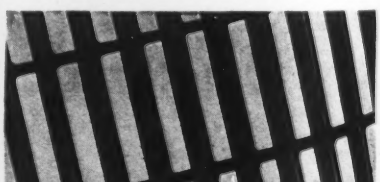

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***Specify* BATES**
FOR LONG-TIME ECONOMY
WALTER BATES COMPANY
208 S. LA SALLE ST., CHICAGO, ILL.

STREETS, etc. (Contracts Awarded, Cont'd.)

†**Tex., Brownwood**—Con. Q.M., Camp Bowie, 45 mi. roads in military area, to Fred Hall, c/o Amicable Bldg., Waco. **$297,905.** Est. $300,000.

Tex., Houston—Harris Co., c/o judge, imprv. 4.7 mi. hy., to R. F. May, 601 N. Edgewood St. **$93,579.** Est. $100,000. H. Zapp, Courthouse, co. engr. Bids 7/26. CD 7/21.

Tex., Laredo—Webb Co., c/o Co. judge, farm-to-market road imprvs. **WPA. $59,660.**

†**Tex., Palacios**—Con. Q.M., Camp Hulen, grading, draining, surfacing roads, to Southern States Constr. Co., So. Standard Bldg., Houston. **$63,442.**

†**Tex., San Antonio**—Con. Q.M., Fort Sam Houston, asphalt paving streets, to Colglazier & Hoff, 326 Sequin Rd. **$92,570.** Est. $100,000.

Washington—R. C. Knapp, dir. State Hy. Dpt., Olympia, imprv. 1.859 mi. Klickitat Co., to Norris Bros., Burlington, **$51,976*****13.93 mi. Whitman Co., to F. R. Hewett, 420 W. 22 Ave., Spokane, **$75,771*****1.075 mi. Clallam Co., to A. Osberg, 612 Lloyd Bldg., Seattle, **$89,712.** Grand total $217,459. Bids 7/29. Rejected bids July 29 imprv. 2.517 mi. King Co. CD 7/15—ENR 7/17.

Wis., Milwaukee—Sheet asphalt paving N. Sherman Blvd., to Badger Constr. Co., 229 E. Wisconsin Ave. **$36,257.** Bids 7/31. CD 7/25.

Wis., West Milwaukee—Concrete paving streets, alleys, to Bodemann Constr. Co., 2803 N. 55 St., Milwaukee. **$26,736.** Bids 7/21, awarded 8/5. CD 7/1—ENR 7/10.

†**Wyo., Fort Francis E. Warren**—Con. Q.M., roads, concrete gutters, to A. H. Read Co., 706 W. 19 St., Cheyenne. **$131,114.**

EARTHWORK, WATERWAYS

PROPOSED WORK

★†**Idaho**—Bureau Reclamation, Boise, bids within 2 months Cascade Irrigation Dam. $3,000,000.

†**Missouri**—U. S. Eng., 601 Davidson Bldg., Kansas City, 4,920 ft. pile and 720 ft. rock dikes, 5,550 ft. revetment in channel of Missouri River between Rocheport and Dundee Reaches, center of work 12 mi. downstream from Jefferson City. $240,000.

†**Missouri**—U. S. Eng., 601 Davidson Bldg., Kansas City, Mo., 3,950 ft. pile dikes and 4,730 ft. revetment in Missouri River between Rulo and Quindaro Bends, center of work being 10 mi. downstream from St. Joseph. $175,000.

†**Oregon**—U. S. Eng., Pittock Blk., Portland, flood control work in Yaquina River. $72,000.

†**Oregon**—Bureau Reclamation, Bend, bids soon 3 lined tunnels, 11 ft. 3 in. diam., 7,609 ft. long, through Smith Rocks, Crooked River Gorge, Deschutes Project.

†**Ore., Detroit**—Dpt. Interior, C St. between 18 and 19 Sts., N. W., Wash., D. C., hydroelectric dam on North Santiam River.

★†**Ore., Grants Pass**—Bureau Reclamation, Denver, Colo., dam on Rouge River to irrigate 42,000 acres Rogue Valley. $10,000,000.

†**Ore., Pilot Rock**—U. S. Eng., Pittock Blk., Portland, flood control work in Birch Creek. $34,000.

†**Rhode Island**—U. S. Eng., 819 Industrial Trust Bldg., Providence, received no bids Aug. 7, removing 730 cu. yd. ledge rock and dredging 3,370 cu. yd. excav., in Providence Harbor and Providence River. CD 7/29—ENR 7/31.

†**Wash., Castle Rock**—U. S. Eng., Pittock Blk., Portland, Ore., levees along Cowlitz River. $31,000.

★†**Wash., Oak Harbor**—Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., bulkhead, dredging, filling, grading for new Naval Air Station. $800,000.

†**Wash., Vancouver**—U. S. Eng., Pittock Blk., Portland, Ore., dikes along 6.5 mi. Columbia River, near here.

BIDS ASKED

Bids Asked August 25

†**Ore., Klamath Falls**—Bureau Reclamation, Klamath Falls, Pump Plant D, Modoc Unit, Tule Lake Div., Klamath Project, Spec. 1339-D.

Bids Asked August 26

†**Arizona, California-Nevada**—Bureau Reclamation, Denver, Colo., furnishing, del. flowmeter for measuring flow of water through 115,000 hp. hydraulic turbine for installation in Boulder power plant, Boulder Canyon project, Spec. 1543-D.

Bids Asked August 27

†**Oregon-Washington**—U. S. Eng., Pittock Blk., Portland, Ore., dredging excavating 23,650 cu. yd. gravel boulders and sand and 37,500 cu. yd. rock in channel Columbia River above Vancouver, Wash., Inc. 698-42-68. $300,000.

Bids Asked August 28

†**Arizona—California—Nevada**—Bureau Reclamation, Denver, Colo., furnishing, del. 15 ton gantry crane for raising and lowering

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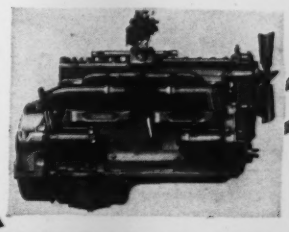

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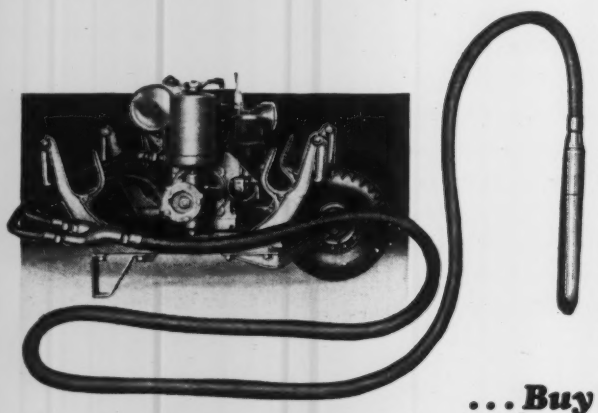

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Adjustable frequency to 6800 R.P.M. — submerged in concrete.

Powerful gas engine—4.7 H.P.

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ELECTRIC TAMPER & EQUIPMENT CO.
DEPARTMENT E LUDINGTON, MICHIGAN

EARTHWORK, etc. (Bids Asked ... Cont'd.)

draft-tube bulkhead gates, ... plant, Boulder Canyon Proje... Boulder City, Spec. 1545-D.

Bids Asked August ...

†Texas—Bureau Reclamation, ... furnishing, del. 1 electrically op... crane for handling bulkhead g... Ford Dam, Colorado River ... Rutledge, Spec. 1546-D.

†Wisconsin—U. S. Eng., 408 ... Milwaukee, removing, disposing ... yd. materials other than ledge rock from channel through Sturgeon Bay.

Bids Asked September ...

†California—Bureau Reclamation, Custom-house, Denver, Colo., furnishing, installing generator for Unit 5, Shasta Power Plant, Central Valley Project, Spec. 984.

Bids Asked September 9

†California—Bureau Reclamation, Custom-house, Denver, Colo., furnishing, del. transformers, for Units 1, 2, 3, 4 and 5, Shasta power plant, Central Valley Project, Spec. 98...

Bids Asked September 10

†Washington—Bureau Reclamation, Custom-house, Denver, Colo., furnishing, del. transformers for Units L-4, L-5 and L-6, in Grand Coulee power plant, Columbia Basin Project, Spec. 983.

LOW BIDDERS

★**†Minn., St. Paul**—U. S. Eng., Post Office and Customhouse, St. Paul, Aug. 6, channel imprv. in various reaches Minnesota River from Watson to Montevideo to Granite Falls, 104,300 cu. yd. earth excav., rock excav. from W. Magee, 18 L. North Snelling Ave., **$139,920.** CD 7/25—ENR 7/31.

CONTRACTS AWARDED

†Calif., San Rafael—U. S. Eng., 491 Customhouse, San Francisco, dredging 98,179 cu. yd. San Rafael Creek, to Bundesen & Lauritzen, Pittsburgh, **$16,690.** CD 8/1—ENR 8/7.

★**Idaho**—Bureau Reclamation, Boise, Anderson Ranch Dam, to Morrison-Knudsen Co., 319 Bway., Boise, J. F. Shea Co., 617 S. Olive St., Los Angeles, Calif., Ford J. Twaits Co., 816 W. 5 St., Los Angeles, Calif., and Winston Bros., 411 W. 5 St., Los Angeles, Calif., **$9,986,203.** Bids 7/7. CD 7/9—ENR 7/17.

★**†O., Portsmouth**—U. S. Eng., Federal Bldg., Cincinnati, flood control work for Portsmouth to New Boston along Ohio River, to Minneapolis Dredging Co., University S... and 25 Ave. S.E., Minneapolis, Minn., **$1,112,400.** Est. $1,200,000. CD 7/30—ENR 8/7.

★**Pa., Pittsburgh**—Comrs. Allegheny Co., R. G. Woodside, controller, Contr. for foundation walls for westbound roadway, Duquesne Way, to John F. Casey Co., Aspinwall, **$540,914.** Bids 7/22. CD 7/29—ENR 7/31, under LB.

Tex., Dallas—Mrs. T. C. Lupton, % Koch & Fowler, engrs., Great Natl. Life Bldg., earthen dam, 390,000 cu. yd. earthwork, to N. M. Whilden, 1522 Exeter St., **$17,285.** Bids 7/26. CD 7/14—ENR 7/10.

★**†Tex., San Antonio**—Con. Q.M., Fort Sam Houston, concrete drainage structures, excavating and some road building, Camp Bullis, relief labor, **$58,631.**

†Tex., San Antonio—Con. Q.M., Fort Sam Houston, concrete drainage structures, etc., relief labor, **$53,286.**

†Va., Fort Monroe—Con. Q.M., reclamation land in Mill Creek, dredging, filling, drainage, etc., to Atkinson Dredging Co., Great Bridge, **$201,097.**

UNCLASSIFIED

PROPOSED WORK

Ala., Tuskegee—AIRPORT—Tuskegee Institute, airport, concrete runways, concrete, steel hangars, etc. $216,420. McKissack & McKissack, Morris Bldg., Nashville, Tenn., archts.

Ia., Hawarden—SWIMMING POOL, etc.—E. H. Ericson, city clk., municipal swimming pool, recreational facilities. $25,000.

Ia., Sioux City—SWIMMING POOL, etc.—Municipal swimming pool, bath house for colored people. $35,000. Bond election soon.

★**†La., Lake Charles**—FLYING SCHOOL—Con. Q.M., advanced single engine flying school. $1,380,000. F. Shutts Sons, Lake Charles, archts. and engrs.

Miss., Koskinsko—DAM, etc.—Koskinsko Country Club, dam, spillway, other facilities on club property. $25,000. H. P. Sullivant, Koskinsko, archt.

★**†Missouri**—RELOCATING RAILROAD LINES—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., relocating ... mi. of C., R. I. & P. Ry. Co. lines between Mercer and Mills Grove, to Peter Kiewit Sons Co., Omaha Natl. Bank Bldg., Omaha, Neb., $1,000,000.

★**Nebraska**—TRANSMISSION LINES—Central Nebraska Public Power & Irrigation Dist., Hastings, 115 kv. transmission line from Johnson Power House, 2 to Grand Island substation and 34.5 kv. line from Johnson Power House 1 to Elm Creek and on to Gothurburg. $994,000. PWA.

UNCLASSIFIED, etc. (Proposed Work, Cont'd.)

★**Nebraska** — TRANSMISSION LINES — Loup River Public Power & Irrigation Dist., Columbus, 115 kv. transmission line from Grand Island substation to Tamasa and from Columbus to Omaha. $1,819,000. PWA.

Oklahoma—PIPE LINE—Texas Pipeline Co., Philtower Bldg., Tulsa, 100 mi. 6 in. steel, welded joint pipe line from point Caddo Co. to Seminole, $110,000.

Pa., Wilkes-Barre—SWIMMING POOLS, etc.—L. K. Eldridge, city clk., swimming pools and play centers, East End sect. and 10 Ward, $50,000. G. B. Walker, city engr.

South Carolina—RURAL ELECTRIC LINES—York County Electric Co-operative, Inc., W. B. Wilkerson, pres., York, 156 mi. rural lines, York and Chester Counties. $147,000 REA allot.

S. C., Charleston — SLOPE PROTECTION, etc.—Charleston Shipbuilding & Drydock Co., 106 Concord St., soon lets contract slope protection, trestles and pier, etc. $125,000. Dotterer Eng. Co., 21 Broad St., engrs.

Tenn., Chattanooga—SWIMMING POOL—W. Judge, Hamilton Co., concrete swimming pool. $50,000.

★**Texas and Illinois**—PIPELINES—Natural Gas Pipe Line Co., 20 N. Wacker Dr., Chicago, Ill., 400 mi. 26 in. steel welded joint pipelines to serve as loop lines along main line between Texas and Chicago, Ill. $17,500,000.

Texas—RURAL ELECTRIC LINES—Cap Rock Electric Co-operative, Inc., O. B. Bryan, supt., Big Spring, 163 mi. rural lines, Borden, Dawson, Glasscock, Howard, Martin and Midland Counties. $128,000 REA allot. Freese & Nichols, Capps Bldg., Ft. Worth, engrs.

Texas—RURAL ELECTRIC LINES—Medina Electric Co-operative, Inc., T. E. Bredthauer, supt., 189 mi. rural lines, Medina and Uvalde Counties. $137,000 REA allot. Texas Eng. Co., 110 E. 10 St., Austin, engrs.

Texas — RURAL ELECTRIC LINES — New Era Electric Co-operative, Inc., Mrs. Eunice Bailey, pres., Athens, 310 mi. rural lines, Anderson, Henderson, Smith and Van Zandt Counties. $246,000 REA allot. Beavers, Lodal & Wells, Smith Young Tower, San Antonio, engrs.

Texas—RURAL ELECTRIC LINES—Rusk County Electric Co-operative, Inc., W. R. Mehner, supt., Henderson, 150 mi. rural lines, Gregg, Panola and Rusk Counties. $125,000 REA allot.

Texas — RURAL ELECTRIC LINES — Sam Houston Electric Co-operative, Inc., M. T. Potts, supt., Livingston, 203 mi. rural lines, Angelina, Polk, Liberty, San Jacinto, Trinity, Walker and Montgomery Counties. $150,000 REA allot. Beavers, Lodal & Wells, Smith Young Tower, San Antonio, engrs.

Texas—RURAL ELECTRIC LINES—South Plains Electric Co-operative, Inc., W. G. Newton, supt., Lubbock, 139.1 mi. rural lines, Hale, Hockley, Lubbock, Lynn and Crosby Counties. $56,000 REA allot.

Tex., Abilene—SWIMMING POOL, etc.—W. W. Hair, mayor, swimming pool, bath house, open air theatre, concrete grandstand. Applied for PWA funds. Freese & Nichols, Capps Bldg., Fort Worth, consult. engrs. E. B. Yates, Abilene, city engr.

★**Tex., San Antonio**—COLISEUM—Plans by G. Smith, c/o Maverick Bldg., coliseum building, etc. $1,800,000. H. R. F. Helland, c/o Frost Bldg., engr.

†**Tex., San Antonio**—AIRPLANE REPAIR BUILDINGS—U. S. Eng., Duncan Field, enlarging airplane repair buildings. $435,000.

★†**Utah, Ogden** — AIRPLANE REPAIR BUILDINGS—U. S. Eng., Hill Field, enlarging airplane repair buildings, incl. adding 2nd unit. $1,500,000.

Wash., Aberdeen—SHIP WAYS, etc.—Grays Harbor Shipbuilding Co., ship ways, 3 marine railways. Over $50,000.

★**Wash., Olympia** — SHIPYARD — Olympia Ship Co., c/o E. N. Eisenhower, Puget Sound Bank Bldg., Tacoma six-way shipyard to construct concrete barges. $1,500,000.

†**Wash., Seattle** — SEAPLANE PARKING AREA—Navy Dpt., 18 St. and Constitution Ave. N.W., exten. seaplane parking area, Sand Point Naval Air Station. $30,000.

†**Wash., Seattle** — RECREATION FACILITIES—Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., recreation facilities, Sand Point Naval Air Station. $175,000.

Wisconsin — RURAL ELECTRIC LINES — Buffalo Electric Co-operative, W. Kilmer, supt., Alma, 57 mi. rural lines, Buffalo and Pepin Counties. $37,000 REA allot.

Wisconsin — ELECTRICAL DISTRIBUTION SYSTEM—Washington Islands Electrical Co-op. Inc., Washington Islands, 26 mi. electrical distr. sys., Project 59. $40,000. Wisconsin Devel. Auth., 110 E. Main St., Madison, engr. CD 7/31—ENR 8/7.

BIDS ASKED

Bids Asked August 19

†**Wyoming** — OBSERVATION POSTS — Con. Q.M., Fort Francis E. Warren, 2 observation posts, Pole Mountain Military Reservation; sdv. ENR 8/14.

Bids Asked August 20

†**Mo., Sikeston** — FLOOD GATES, etc. — Farm Security Administration, Sikeston, flood gates, culverts, roads, drainage ditches, structures.

. . . ROCK ISLAND Municipal Water Works, another Darling Valve user

To valve users everywhere, Darling's "dense-metal" construction means better machining, more accurate threading, and freedom from flaws or shrink—in short, *better performance.*

From the smooth, uniform design . . . through careful foundry technique, accurate molding, proper gating and heading . . . every step in Darling production is directed toward the smooth, close structure known as "dense-metal". Get the benefit of this extra care . . . specify Darlings for your next installation!

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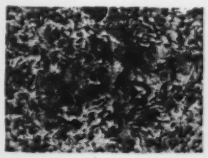
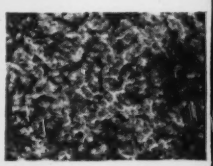
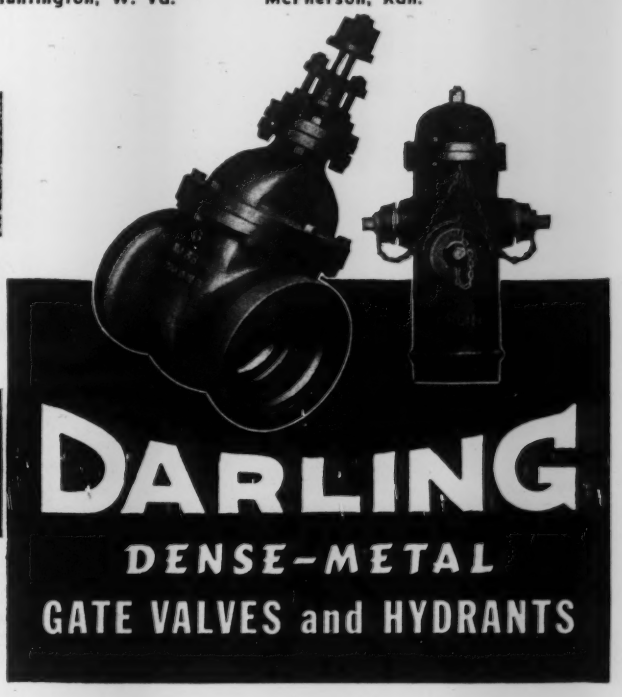
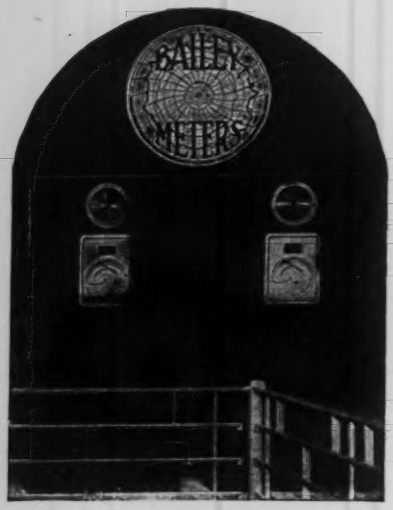


Photomicrograph (mag. 100x) showing the structure of a typical sample of cast iron as ordinarily produced. Note the entrained inclusions tending to break down the strength of the metal and produce leaks.



Showing the structure of Darling Dense Metal gray iron. In this dense, fine, homogeneous grain structure the shrinkage porosity has been minimized, with resultant pressure tightness, strength and better resistance to abrasion and corrosion.





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UNCLASSIFIED (Bids Asked, Cont'd.)

Bids Asked August 22

†**Ill., Chanute Field (Rantoul)**—SPORTS ARENA—U. S. Eng., P. O. Box 59, Louisville, Ky., sports arena.

†**Utah, Salt Lake City** — AIRPORT IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., grading, paving Salt Lake City Municipal Airport. Over $25,000. CAA.

Bids Asked August 23

†**Ariz., Yuma**—AIRPORT IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., grading, paving, etc., Flying Field, 5 mi. south of here. Extended date. Over $25,000. CD 8/6, under Roads.

Bids Asked August 27

†**Oregon**—INSULATOR UNITS—Bonneville Power Administration, 811 N.E. Oregon St., Portland, furnishing insulator units for miscellaneous lines of Bonneville Transmission Sys., Inv. 2158.

Bids Asked August 28

Ill., Chicago — SUBWAY STRUCTURAL STEEL—At office P. Harrington, comr. Subways & Superhighways, 20 N. Wacker Dr., furnishing, del. fabricated structural steel for connections with Chicago Rapid Transit lines, State St. and Dearborn St. Subways; adv. ENR 8/14.

Bids Asked About September 2

★†**Wash., Seattle**—PIER—Con. Q.M., pier north of Pier A at Quartermaster Depot. $2,000,000. M. O. Sylliaasen and L. Bouillon, archts., and Bebb & Jones, engrs., all 1519 Alaskan Way. CD 6/27—ENR 7/3.

Bids Asked September 11

Ill., Chicago—SUBWAY VENTILATION EQUIPMENT—At office P. Harrington, comr. Subways & Superhighways, 20 N. Wacker Dr., Contd. M-3, ventilation equip. for State St. and Dearborn St. subways; adv. ENR 8/14.

Bids Asked

Tex., Brownsville—SHIP WAYS—Brownsville Shipbuilding Corp., c/o S. F. Ewing, Brownsville, and c/o Morris Plan Bank Bldg., San Antonio, 2 shipbuilding ways. $100,000.

LOW BIDDERS

Calif., Oakland—HANGAR, etc.—City Port Comn., foot of Grove St., Aug. 8, school hangar, shops, offices, dope and spray building and engine test bldg., municipal airport, from D. W. Nicholson Corp., 357-12 St., **$39,386.** CD 8/4.

N. Y., Brooklyn — RECONSTRUCTING TRACKS—Bd. Transportation, 250 Hudson St., New York, Aug. 1, reconstructing tracks and contact rail for part of Rapid Transit R.R., Route 49, Sect. 2, from Tully & DiNapoli, Inc., 1 Bridge Plaza, Long Island City. **$148,767.** CD 7/14—ENR 7/17.

Utah, Salt Lake City—APRONS and TAXIWAYS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., Aug. 6, aprons and taxiways, municipal airport, from W. E. Ryberg Co. and Mullins & Wheeler, 206 Terminal Bldg., **$225,250.** CD 7/24.

CONTRACTS AWARDED

†**Ala., Anniston**—HARD STANDING AREAS—Con. Q.M., hard standing areas, Fort McClellan, to Vandergriff Constr. Co., Inc., 4708 N. Court St., Montgomery, **$94,870.** Bids 7/29, awarded 7/30.

†**Ala., Dothan**—HANGARS—U. S. Eng., U. S. Courthouse and Customhouse, 3 hangars, Dothan Airfield, to Southeastern Constr. Co., Inc., Ozark, and Henderson, Black & Green, Inc., Troy. **$140,000.**

†**Ala., Tuskegee**—HANGARS—U. S. Eng., Customhouse and Courthouse, Mobile, 3 hangars, Tuskegee Airfield, to McKissack & McKissack, Morris Memorial Bldg., Nashville, Tenn. **$136,000.**

†**Arizona** — TRANSMISSION LINE CONDUCTOR—Bureau Reclamation, Customhouse, Denver, Colo., furnishing 1,900,800 lin ft. (360 mi.) copper conductor for Parker Dam's power sys., to Nehring Electrical Wks., De Kalb, Ill., **$216,729;** 760,320 lin ft. (144 mi.) to Anaconda Wire & Cable Co., 25 Bway., New York, N. Y., **$135,213.** Bids 7/18.

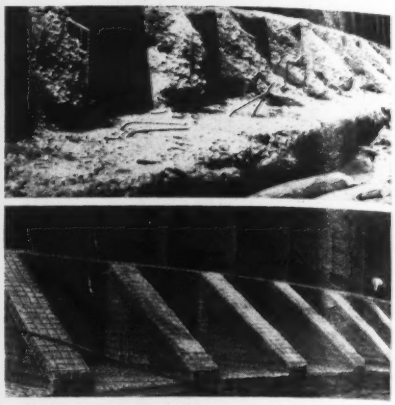
Ariz., Phoenix—HANGARS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., demountable hangars, appurtenances, Litchfield Park Airport, to Del E. Webb Constr. Co., 1633 W. Jefferson St., Phoenix, **$123,866.** Awarded 7/31.

†**Ariz., Valle**—AIRPORT—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., airport, grading, paving for runways, to Tiffany Constr. Co., W. Bway Rd., Phoenix. **$74,768.**

★**California**—PIPELINE—Shell Oil Co., E. F. Davis, vice pres., Shell Oil Bldg., Los Angeles, constructing 90 mi. 10 in. steel pipeline from Wilmington refinery to Ventura oil pump. sta. to Macco Constr. Co., 815 N. Paramount Blvd., Clearwater, approx. **$500,000.** CD 2/26—ENR 3/6.

Calif., Del Mar—TRACK CHANGE—Atchison, Topeka & Santa Fe R.R. Co., M. C. Blanchard, ch. engr. (Coast Lines) 560 S. Main St., Los Angeles, line change in tracks south of here, incl. exten. concrete arch

A POWER DAM



These photos show the disintegrated condition of the buttresses of the downstream face of the Rock Spillway of a power dam of the Central New York Power Corporation, Trenton Falls, N. Y., and the reinforcement placed for "GUNITE" restoration of the structure.

Our Bulletin 1200, showing similar and many other types of "GUNITE" work, is available on request.

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bridge, etc. to Sharp & Fellows Contg. Co., Central Bldg., Los Angeles. Est. **$100,000.**

†**Calif., Fort Ord**—SPORTS ARENA, etc.—Con. Q.M., sports arena, clothing and equip. repair shop motor repair shop, etc., to F. J. Twaits and Morrison-Knudsen, P. O. Box 337, Paso Robles. **$116,122.** CD 7/30.

Calif., Fresno—ICE SKATING RINK—Fresno Rink, Inc., c/o contractor, 160x240 ft., ice skating rink to T. T. Cowan, 538 Brix Bldg. **$165,000.**

†**Calif., San Miguel**—SPORTS ARENA—Con. Q.M., Camp Roberts, sports arena, to F. J. Twaits & Morrison, Knudsen Co., 816 W 5 St., Los Angeles. **$75,890.** CD 7/28—ENR 7/31.

†**Calif., Taft**—AIRPORT IMPROVEMENTS—U. S. Eng., 208 Post Office Bldg., San Francisco, water, gas, sewer, storm drain and electrical sys., Taft Airport, to W. W. Peltey, 1426 South La Brea Ave., Los Angeles. **$244,345.**

†**Ga., Hinesville**—HARDSTANDING AREA—Con. Q.M., hardstanding area, to Espy Paving Associates and W. C. Shepherd, 545 Piedmont Ave., Atlanta. **$227,651.** Awarded 7/31.

†**Ill., Chanute Field (Rantoul)**—RUNWAYS—Con. Q.M., runways, to Thomas McQueen Co., Forest Park. **$334,084.**

★**Kansas**—TRANSMISSION LINES—Kansas Gas & Electric Co., 201 N. Market St., Wichita, 186 mi. 154,000 volt transmission line from El Dorado to Sabetha, to connect with Nebraska Power Co., Omaha, Neb. line, to Continental Constr. Co., 340 N. Central St., Chicago, Ill. Est. **$2,500,000.**

†**Kan., Fort Riley**—STABLES, etc.—Con. Q.M., stables, watering trough and blacksmith shops, utilities, to George Senne Co., 510 E. 15 St., Topeka. **$146,000.**

★†**Mass., South Weymouth** — AIRCRAFT BASE—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., lighter than aircraft base, Contr. Y-4962, to Barletta Constr. Co., 10 Whipple Ave., and Sawyer Constr. Co., 31 St. James Ave., both Boston, **$5,620,000.** CD 1/7—ENR 1/9.

★**Oklahoma** — GAS PIPE LINE — Ray Stephens, Inc., 1st Natl. Bldg., Oklahoma City, 55 mi. 16 in. natural gas pipe line from Cement to Cities Service gas line, Oklahoma City, 2 booster stations, own forces. **$750,000.**

Okla., Oklahoma City—AIRPORT—U. S. Eng., Oklahoma City, paving, drainage, lighting, Okla. City Municipal Airport 2, to Brooks & Dahlgren, Inc., Insurance Bldg. **$145,147.**

†**Okla., Tulsa**—AIRPORT—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D.C., supplemental contract bomber assembly plant airport, to Manhattan Constr. Co., Muskogee, and Lowell Constr. Co., Tulsa, **$386,330.**

Ore., Eugene—RUNWAY, etc.—Paving 3rd runway, taxiways, airport, to E. C. Hall and J. C. Compton, McMinnville. **$100,000.**

†**Pa., Middletown**—ELECTRIC DISTRIBUTING SYSTEM—U. S. Eng., Baltimore, Md., electric distr. sys., air depot, to Howard P. Foley, Inc., 1630 Pine St., Phila. **$134,700.**

Pa., Pittsburgh—LOADING PLATFORMS—Pennsylvania R.R., C. I. Leiper, ch. engr. (Central Region,) Pennsylvania Sta., 2 brick, steel frame, loading platforms, 11 St. and AV RR, separate contracts. **$40,000.**

†**S. C., Fort Jackson**—HARD STANDING AREAS—Con. Q.M., hard standing areas, to C. G. Fuller, Barnwell, **$179,797.** Bids 7/28, awarded 7/30.

★†**Tenn., Paris** — BARRAGE BALLOON TRAINING CENTER—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., barrage balloon training center repair, incl. 408 buildings, roads, fencing, utilities, to Rock City Constr. Co., 135 4 Ave. N., and T. M. Strider Co., Cotton States Bldg., both Nashville. **$5,254,968.** R. H. Hunt Co., Chattanooga Bank Bldg., Chattanooga, archts. and engrs.

†**Tenn., Tullahoma**—SPORTS ARENA—Con. Q.M., sports arena, to Edgar Lambert Constr. Co., Co., Lewisburg, **$82,985.**

Tex., Beaumont — AIRPORT IMPROVEMENTS—Airport grounds imprvs., grading, leveling, etc. **WPA. $50,631.** Heartfield & Woodside, 1011 American Natl. Bank Bldg., archts.

†**Tex., Brownwood** — GROUND IMPROVEMENT — Con. Q.M., Camp Bowie, ground imprv., drainage ditching, leveling, etc., relief labor. **$65,968.**

†**Tex., Palacios**—RIFLE TARGET RANGE—Con. Q.M., Camp Hulen, rifle range, embankments, levees, etc., to Southern States Constr. Co., So. Standard Bldg., Houston, **$72,000.**

Utah, Salt Lake City—STORAGE YARDS—Denver & Rio Grande Western R. R., A. E. Periman, ch. eng., Equitable Bldg., Denver, Colo., enlarging Roper storage yards, expanding rail facilities, own forces. **$50,000.**

★†**Wash., Bremerton**—PIER—Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., 120x800 ft. supply pier with transit shed, etc., Spec. 10491, to Sound Constr. Co., Northern Life Tower, Seattle, and Peter Kiewit & Sons, 1024 Omaha Natl. Bank Bldg., Omaha, Neb., **$799,900.** CD 3/26—ENR 4/3.

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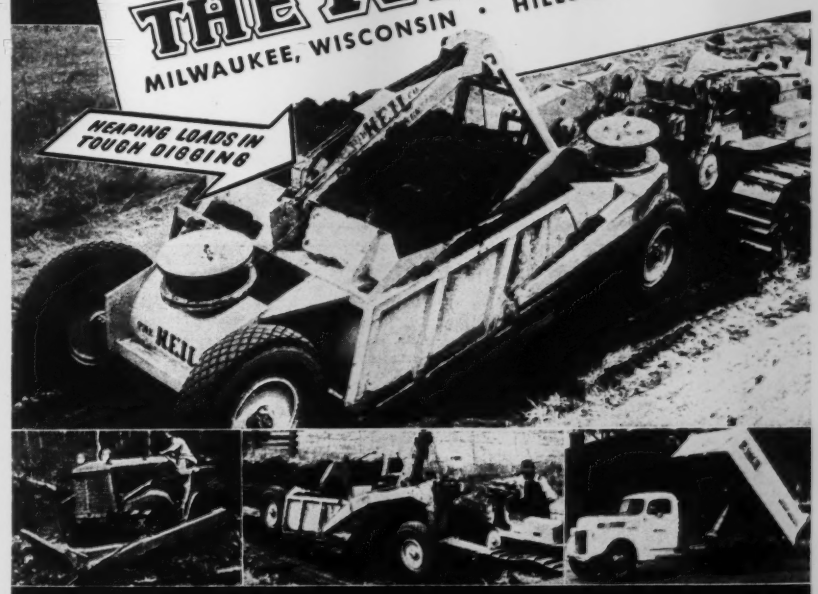

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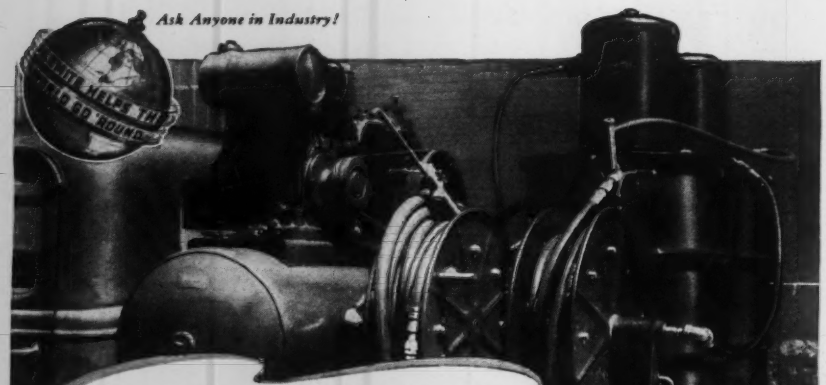

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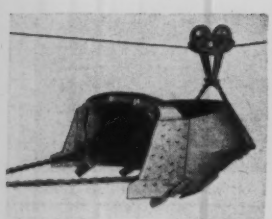

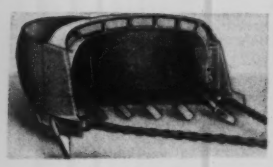

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PUBLIC BUILDINGS

PROPOSED WORK

Ark., Hope—Hope School Bd. plans by A. N. McAninch, Insurance Bldg., Little Rock high school. $175,000.

†Calif., Fort Ord—Con. Q. M., Fort Ord, reconstructing detention wards.

†Calif., Sacramento—U. S. Eng., Post Office Bldg., cancelled bids to have been opened about Aug. 10, four 60x153 ft. warehouses. CD 8/3, under McClellan Field.

Calif., Vallejo—Vallejo Unified School Dist., plans by H. J. Devine, Cronan Bldg., Sacramento, 2 schools. $225,000. CD 7/21—ENR 7/24.

Conn., Ansonia—Bd. Educ. sketches by Brown & Von Beren, Inc., 295 Sherman Ave., New Haven, brick, steel Senior High School, Prospect St. $275,000.

Conn., Newtown—Bd. Selectmen, Town Hall, sketches by Brown & Von Beren, Inc., 295 Sherman Ave., brick, steel high school. $150,000.

★**Ga., Albany**—Albany Hospital, Hospital Auth., c/o E. H. Kalmon, chn., plans by W. J. J. Chase, 140 Peachtree St., N.E., Atlanta, hospital. $725,000. CD 3/11/40—ENR 3/21/40.

★**Idaho, Pocatello**—Pocatello Housing Auth., low cost housing. $600,000. USHA.

★**†Ill., Melrose Center** — General Motors Corp., Buick Motor Div., 840 N. Michigan Ave., Chicago, Ill., and Flint, Mich., additional construction, Melrose Center plant and acquisition, installation additional equip. for this plant and Flint Mich. plant, for War Dpt. $10,267,043. Defense Plant Corp. will finance.

†Ill., Monsanto (br. East St. Louis)—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., plant to manufacture protective chemicals for Chemical Warfare Service, Monsanto Ave. and Falling Springs Rd. $400,000.

Ia., Murray—Light plant, distr. sys. $80,000 bond issue approved.

Kan., Kansas City—Prairie School Dist., Johnson Co., RFD Kansas City, Kan., plans by Keene & Simpson, Land Bank Bldg., Kansas City, Kan., grade school. $300,000. Applied for PWA gr.

★**Kan., Kansas City**—State, Topeka, plans by R. A. Stookey, Capitol Bldg., Topeka, 90 bed addn. Bell Memorial Hospital, 39 St. and Rainbow Blvd., $550,000.

Kan., Wichita—Bd. Educ., plans by L. Schmidt, Wichita, vocational training school. $345,000. Applied for PWA gr. Cd 7/16—ENR 7/24.

Md., Aberdeen—Harford County School Comn., Court House, Belair, sketches made by Taylor and Fisher, 1012 N. Calvert St., Baltimore, 2 story, 50x130 ft., brick, stone, grade and high school, concrete fdn. $150,000. PWA.

†Md., Baltimore—Baltimore Housing Auth., 709 E. Eager St., plans by Lucius R. White, Jr., 10 W. Chase St., two hundred 2 story, 22x30 ft. brick, frame defense housing units, No. 18098-X Westport Section, for USHA.

★**Md., Belair** — Harford Co. School Bd., Courthouse, Belair, sketches completed by A. Shaw, Belair, and Taylor & Fisher, 1012 N. Calvert St., Baltimore, 3 schools. $540,000.

Md., Havre de Grace—Harford County School Comn., Court House, Belair, sketches made by Taylor & Fisher, 1012 N. Calvert St., Baltimore, 2 story, bsmnt., 50x130 ft., brick, stone, school. $150,000. PWA.

★**†Md., Sparrows Point (Br. Baltimore)**—Bethlehem Steel Co., E. G. Grace, pres., preliminary plans 780,000 ton high speed plate mill. $23,097,000. OPM recommends project.

★**Md., Towson**—Baltimore Co. Bd. Educ., Court House, 7 sketches completed school buildings, various locations. $1,626,167.

★**†Mass., Springfield**—American Bosch Corp., 3664 Main St., plant, for Navy Dpt. $869,933 land and buildings, $1,248,675 machinery and equip. Defense Plant Corp. will finance.

Mich., Battle Creek—Bd. Educ. plans by L. J. Sarvis, Bailey Bldg., for Lakeview High School, 2 and 3 story, bsmnt., brick, steel, stone, rein.-con. $400,000.

★**Mich., Lansing**—Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit, plans by Bowd-Munson, 409 Wilson Bldg., propeller manufacturing plant. $8,400,000. Defense Plant Corp. will finance. CD 7/15—ENR 7/17.

Mich., Pontiac—Oakland Co., plans by L. J. Heenan, 609 Peoples State Bldg., remodeling building for county office building. $200,000.

★**Mo., Clayton (St. Louis P. O.)**—St. Louis Co. Court c/o W. E. Miller, clk., plans by Wm. B. Ittner, Inc., 408 Bd. Educ. Bldg., St. Louis, 5 story, bsmnt., brick, concrete health center, St. Louis County hospital grounds. $522,500. PWA.

★**Mo., Springfield**—Springfield Housing Auth., c/o H. B. Carr, mayor, group low rent homes. $1,000,000.

†Mont., Missoula—Immigration and Naturalization Service, Dpt. Justice, 10 and D Sts., Wash., D. C., 16 barracks for detention station, Fort Missoula.

PUBLIC BLDGS. (Proposed Work. Cont'd.)

†**N. J., West Orange (br. Orange)**—Henry L. Crowley & Co., West Orange, additional plant, machinery and equip., for manufacture ceramic parts. $245,000. Defense Plant Corp. will finance.

★†**N. Y., Wheatfield**—Bell Aircraft Corp., 2050 Elmwood Ave., Buffalo, plant for manufacture airplane parts, for War Dpt., $5,596,924 for land and buildings, $2,859,251 machinery and equip. Defense Plant Corp. will finance.

★**N. Y., New York**—Bd. Higher Educ., 695 Park Ave., School of Technology bldg. at City College. $1,650,000.

★**N. Y., New York**—New York City Housing Auth., 122 E. 42 St., Chelsea homes, two 11 story, two 12 story buildings, 4½ acre site bounded by W. 25 and W. 27 Sts. from 10 Ave. halfway to 9 Ave. $4,300,000. A. M. Brown, 140 E. 34 St., ch. archt. W. Lescaze, 211 E. 48 St. and Morris & O'Connor, 101 Park Ave., archts. CD 8/9—ENR 8/15.

★**O., Akron**—Bd. Educ., Hazel Fleek, clk., Central High School, plans by M. E. Murphy, Central High School, East High, Ellet High, Garfield High, Flower Vocational, and Hangar Bldg. addns. $1,435,000.

Pa., Erie—Erie Housing Auth., J. A. Schmid, exec. dir. and secy., 207 Hayes Bldg., 60 unit housing for colored families, Proj. USHA Pa. 13 Sec. 2, German St. between E. 16 and E. 17 Sts. $315,000. USHA.

O., Berea—R. Kobie, Safety-service dir., bids 30 days, new surface condenser, mechanical draft cooling tower for city municipal light plant. $43,000.

★**O., Cleveland**—F. J. Bubna, dir. Pub. Property, plans by H. Kregelius, 517 City Hall, city archt., pharmacy and service bldg., out patients bldg., power house, repairing present bldgs., etc., City Hospital. $3,010,600.

†**O., Cleveland**—National Advisory Com. for Aeronautics, E. R. Sharp, constr. administrator Langley Field, Hampton, Va., 58x72 ft. central heating plant, 28 ft. high. $60,000.

★**Pa., Allentown**—Allentown Housing Auth., plans by G. E. Yund, 16 S. 6 St., residential development. $510,000. CD 7/24—ENR 7/31.

Pa., Ellwood City—Ellwood City Hospital, Rev. Chas. Bell, pres. Bd. Dir., Border Ave., sketches by B. J. McCandless, 239 4 Ave., 4 story, brick, tile hospital addn. $150,000.

Pa., Gettysburg—Comrs. Adams Co., plans by J. B. Humme, York, brick, steel, concrete prison, county farm, near here. $150,000.

Pa., Pottstown—Pottstown Housing Auth., c/o H. Y. Siedel, chn. in charge, 75 unit housing. $320,000 USHA.

†**Pa., Wilkes-Barre**—National Youth Administration, 15 St. and New York Ave., Wash., D. C., 56x140 ft. workshop with 20x140 ft. wing, incl. boiler plant, office welding shop, etc. $140,000.

S. C., Beaufort—Plans by H. S. Singley, Columbia, brick, concrete school. $150,000.

★**S. C., Greenville**—Greenville Housing Auth., housing. $900,000.

Tenn., Jackson—A. Wilde, judge Madison Co. hospital and health center. $250,000.

†**Tex., Abilene**—Con. Q.M., Camp Barkeley, 3 theatres, hospital bldg., from Yarbrough & Reinhardt, 5 and Navasota Sts., Austin, $170,000 and $227,407 respectively. CD 4/17—ENR 4/24.

Tex., Brownwood—Brownwood Housing Auth., Brownwood, 300 unit housing. $350,000 USHA. Phelps & DeWees & Simmons, Majestic Bldg., A. B. and R. M. Ayres, Smith-Young Tower, all San Antonio, archts. J. W. Beretta Engineers, Natl. Bank of Commerce Bldg., Matthews & Kenan, 1615 Smith-Young Tower, F. E. Simpson, 1445 Milam Bldg., and H. R. F. Helland, 503 Frost Bldg., all San Antonio, engrs. CD 7/24—ENR 7/31.

★**Tex., Corpus Christi**—City and Nueces Co., plans by N. W. Hardy, c/o Nixon Bldg., city-county charity hospital plant, facilities, $1,736,371.

Tex., Dallas—V. R. Smith, acting city mgr., plans by J. N. McCammon, Allen Bldg., school addns. $220,500. Applied for PWA funds. F. W. Chappel, 309 Burt Bldg., engr.

Tex., Denton—Texas State College for Women, c/o W. R. Loveless, bus. mgr., plans by P. M. Geren, 806½ Burnet St., Fort Worth, 3 and 4 story, brick, concrete home economics building. $175,000. CD 3/4—ENR 3/6.

★**Tex., Fort Worth**—Bd. Educ., c/o E. P. Williams, bus. mgr., plans by W. G. Clarkson, 1st Natl. Bank Bldg., 1 and 2 story, bsmt., 48x386 ft., vocational school. $887,-135. Applied for PWA funds.

★**Tex., Freeport**—Freeport Ind. School Dist., c/o O. A. Fleming, supt., plans by A. B. Dow, Freeport, school imprvs. $740,000. Applied for PWA funds.

Tex., Harlingen—School. $169,250.

Tex., Mineral Wells—J. C. Miller, mayor, plans by P. M. Geren, 806½ Burnett St., Fort Worth, 2 story, brick, hollow tile, public health civic center. $175,455. Applied for PWA funds.

Tex., Orange—Bd. Educ., plans by C. H. Page & Son, Enfield-Gracy Bldg., Austin, school $225,000 and Junior High School $415,-000. CD 7/30—ENR 8/7.

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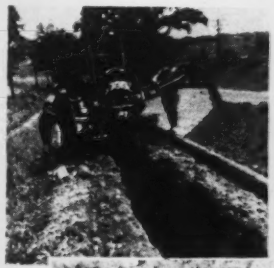

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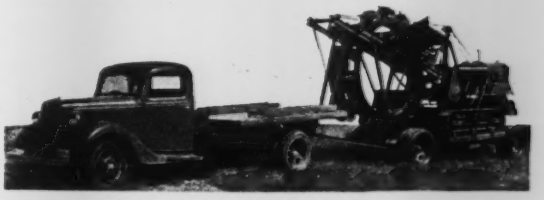

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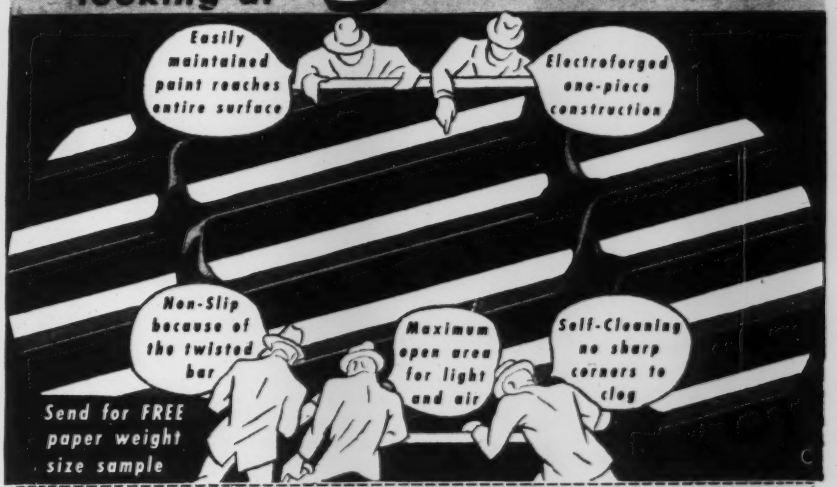
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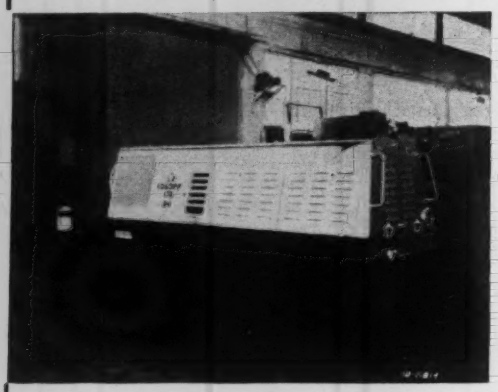

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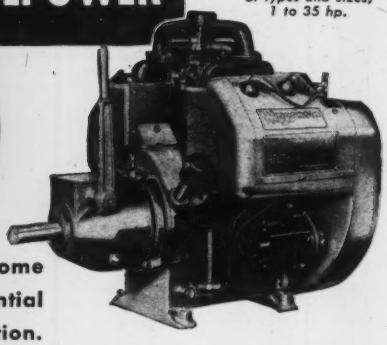

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PUBLIC BLDGS. (Proposed Work Cont'd.)

Tex., Palacios—Palacios Ind. School Dist., c/o R. P. Newsom, supt., Palacios, school and manual training school. $248,000. Hedrick & Lindsley, Inc., 818 Southern Standard Bldg., Houston, archts. Applied for PWA funds. CD 4/23—ENR 5/1.

★**†Tex., Paris**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., buildings for housing 30,000 man Army division, $23,000,000. Rollins & Forest, Victorian Bldg., Dallas, archts and engrs. CD 7/23—ENR 7/31.

Tex., San Antonio—San Antonio State Hospital, S. Presa St., plans by Phelps & De Wees and Simmons, Majestic Bldg., ward building and hospital. $195,000. CD 2/14—ENR 2/20.

Tex., San Antonio—Con. Q.M., Fort Sam Houston, reconstructing mechanical shop, camp area, Camp Bullis, 18 mi. north of here, relief labor. $168,379.

Tex., Wichita Falls—Bd. Educ., c/o O. B. Burden, pres., plans by Voelcker & Dixon, 913½ Indiana St., vocational and technical high school, vocational school for negroes, 2 junior high schools. $800,000. Applied for PWA funds. CD 6/19—ENR 6/26.

†Tex., Waco—National Youth Administration, c/o J. C. Kellam, state administrator, Waco, twelve 2 story, 35x156 ft. dormitories, 120x360 ft. shop, gymnasium, etc. $350,000. G. W. Johnson, 805½ W. 16 St., Austin, archt. Terrell Bartlett, Smith-Young Tower, San Antonio, engr.

★**Va., Portsmouth**—Portsmouth Housing Auth., plans by J. J. Rowland, 105 High St., 150 to 180 housing units in connection slum clearance work. $840,000.

†Wash., Fort Lewis—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., motor repair shops, oil storage house, grease and wash rack.

Wash., Longview—Cowlitz Co., Courthouse, Kelso, plans by D. Stewart, Vancouver, hospital, $153,131. PWA.

★**Wash., Poulsbo**—Poulsbo Housing Auth., 300 to 600 defense housing units. $1,000,000.

★**†Wash., Seattle**—Con. Q.M., quartermaster depot. $1,398,537. Austin Co., 16112 Euclid Ave., Cleveland, O., archts and engrs.

★**Wash., Seattle**—King Co., County-City Bldg., plans by J. M. Taylor, Textile Bldg., Harborview county hospital addn. $500,000. PWA. CD 11/15—ENR 11/21.

†Wash., Spokane—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., maintenance headquarters squadron, subdepots for maintenance, supply and repair, Geiger Field.

Wash., Spokane—Soldier's recreation center, $300,000. WPA.

Wis., Washburn—Bd. Educ. plans by T. J. Shefchik, 307 Lonsdale Bldg., Duluth, Minn., 60x153 ft., brick school. $219,870.

Wis., Waterloo—F. A. Buth, village clk., rebuilding light plant. $104,000. Commercial Testing & Eng. Co., 307 N. Michigan Ave., Chicago, Ill., engrs.

★**†Alaska, Kodiak**—Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., exten. cold storage commissary and laundry building, Naval Air Station, $100,000; ammunition storage and additional submarine-operating facilities, $3,413,000.

BIDS ASKED

Bids Asked August 16

★**†Conn., Bridgeport**—Federal Works Agency, Wash., D. C., 250 defense housing units, Conn. 6053-X, Evers St. off Huntington Turnpike. $750,000-$900,000. W. J. Skinner, 128 Bank St., archt. CD 8/5—ENR 8/7.

Bids Asked August 18

†Ark., McGehee—Farm Security Administration, Little Rock, necessary buildings for 4 farm units. CD 8/6.

★**†Md., Curtis Bay (Sta. Baltimore)**—Baltimore Housing Auth., 709 E. Eager St., Baltimore, 300 defense housing units, Project 18096-X, for USHA. $1,000,000. W. D. Lamdin, 1020 St. Paul St., Baltimore, archt.

★**†Md., Curtis Bay-Fairfield (Sta. Baltimore)**—Baltimore Housing Auth., 709 E. Eager St., Baltimore, 500 defense housing units, Project 18097-X, for USHA. $1,500,000. J. R. Edmunds, Jr., 409 Calvert Bldg., Baltimore, archts.

†Massachusetts—U. S. Eng., Park Sq. Bldg., Boston, 2 steel framed buildings, Fort Revere, Hull, also 2 steel framed buildings, Fort Ruckman, Nahant.

†New Hampshire—U. S. Eng., Park Sq. Bldg., Boston, Mass., steel framed building, Fort Constitution, New Castle.

Ont., Ottawa—Secretary Dpt. P. Wks., 2 story, bsmnt., in part of building, Dominion Government temporary Office Building, 8 Preston St. and Carling Ave. $200,000-$250,000. C. D. Sutherland, c/o owner archt. CD 8/5.

★**Calif., Los Angeles**—Housing Auth., 1031 S. Bway., Rancho San Pedro Housing, $1,298,500. Extended date. CD 7/22—ENR 7/24.

PUBLIC BLDGS. (Bids Asked, Cont'd.)

†**D. C., Wash.**—Alley Dwelling Auth., Farm Credit Bldg., Wash., D. C., 350 dwelling units, for Navy civilian employees DC.-49017 X, Condon Terrace, Atlantic St. and 8 St. S.E. CD 7/10—ENR 7/17.

†**Mo., Sikeston**—Farm Security Administration, Sikeston, 40 barns, 40 dwellings, 40 storage buildings, drilling 40 wells.

Pa., Pittsburgh—Bd. Comrs. Allegheny Co., R. G. Woodside, controller, County Office Bldg., jail alterations, etc. $150,000. CD 1/2—ENR 1/9.

Bids Asked August 20

Conn., Stamford—Supt. Schools, 59 Prospect St., plans by Provoost & Everett, 421 Main St., 2 story, bsmnt., brick, steel, concrete Cloonan School, Toms Rd., Hope and Woodland Sts. $150,000.

★†**Miss., Biloxi**—Biloxi Housing Auth., 175 defense housing units for Army personnel and civilian employees of Air Corps Technical School, for USHA. $500,000. Landry & Matthes, Hattiesburg, archts. CD 8/5—ENR 8/7.

†**Wyo., Fort Francis E. Warren**—Con. Q.M., communication building; adv. ENR 8/14.

Bids Asked August 22

†**California**—Bureau Reclamation, Old Post Office Bldg., Sacramento, combination stations, 4-room dwellings, 4-family section houses, tool houses, woodsheds, Southern Pacific R.R. relocation, Spec. 968.

†**Tex., Fort Bliss**—Public Building Administration, Wash., D. C., maintenance and management building, etc., at defense housing project; adv. ENR 8/14.

†**Wash., Everett**—Pub. Bldgs. Administration, Wash., D. C., 85 housing units, Army airbase. $250,000. CD 5/28—ENR 6/5.

Bids Asked August 25

†**Calif., Lerdo**—Kern County Housing Auth., 3801 North Chester Ave., Bakersfield, 85 unit housing 12 mi. from Bakersfield, adjacent to U. S. Air Corp Training School, for USHA. $285,000. CD 8/7.

Bids Asked August 26

Calif., Fresno—H. F. Allardt, secy., Housing Auth., Fresno, 712 Mattei Bldg., low rent housing, Cal. 6-3. Over $150,000. H. R. Lake & D. H. Horn, 909 Mattei Bldg., archts. CD 7/2—ENR 7/10.

Ont., Ottawa—Purchasing Agent, National Research Council, laboratory building, Montreal Rd., 3 mi. east of here. $250,000-$300,000. CD 6/9.

Bids Asked August 28

†**La., New Orleans**—Civil Aeronautics Administration, Commerce Bldg., Wash., D. C., radio communication facility transmitter and receiver buildings, near here; adv. ENR 8/14.

Nev., Winnemucca—Directors Humboldt Co. High School Dist., rein.-con. high school. Over $150,000. F. A. Brinkman, Kalispell, Mont., archt. Bids 7/25 rejected. CD 8/4—ENR 8/7 under LB.

Bids Asked September 3

Calif., Stockton—A. Boyd, state archt., P. Wks. Bldg., Sacramento, 1 story, rein.-con. ward building, for State.

Bids Asked September 4

†**California**—Bureau Reclamation, Old Post Office Bldg., Sacramento, locomotive fuel-supply station, Siding 1 Southern Pacific R.R. relocation, Kennett Div., Central Valley Project, about 5 mi. north of Redding, Spec. 982. adv. ENR 8/14.

Ill., Quincy—Quincy Housing Auth., H. E. Wisherd, chn., Stern Bldg., 200 dwelling units, Project Ill. 16-1, and 49 dwelling units, Ill. 16-2. CD 8/19/40—ENR 9/24/40.

Bids Asked About September 5

†**O., Cleveland**—National Advisory Com. for Aeronautics, E. R. Sharp, constr. administrator, Langley Field, Hampton, Va., fuel and lubricants bldg., 2 story, bsmnt., 50x100 ft. with two 50x100 ft. wings. $450,000. CD 7/14—ENR 7/17.

Bids Asked September 15

★**Wash., Seattle**—Seattle Housing Auth., Central Bldg., 168 additional low cost housing units, Yesler Terrace Project. $500,000. USHA. Holmes, Aitken, Bain, Stoddard & Jacobsen, Lloyd Bldg., archts. CD 5/7—ENR 5/15.

Bids Asked October 7

N. C., Fayetteville — Fayetteville Housing Auth., D. J. DeVane, exec.-dir., two 56 unit housing (white and colored). $396,000. CD 6/16—ENR 6/26.

LOW BIDDERS

★**Calif., Los Angeles**—Housing Auth. of City of Los Angeles, 1031 S. Bway., Aug. 5 general contract Pueblo Del Rio housing, from R. E. Campbell Co., 316 E. Weber St., Compton, **$1,259,852*****sewer collection, water and gas distr., plumbing, from F. C. Schilling, 3215 Beverly Blvd., **$134,776*****electrical distr., from Korb Electric Co., 5734 York Blvd., $49,349. CD 7/22—ENR 7/24.

Calif., Pasadena—Bd. Educ., Aug. 6, rein.-con. cafeteria and student union building.

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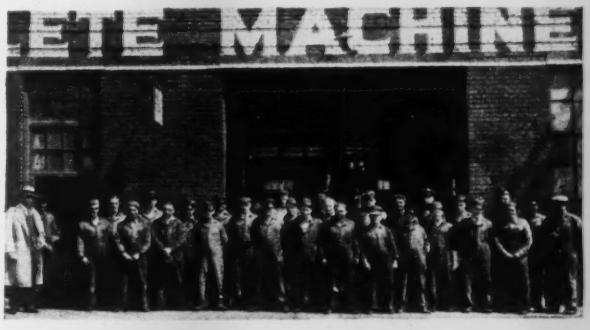

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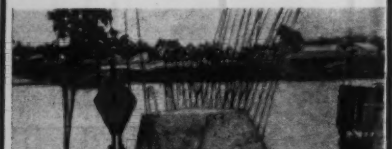

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PUBLIC BLDGS. (Low Bidders. Cont'd.)

1570 E. Colo. St., from W. I. Loesch, 119 E. Union St. **$168,000.** C. Bennett, 311 First Trust Bldg., archt.

★**†Conn., Fairfield**—Federal Works Agency, Wash., D. C., Aug. 8, defense housing, Project Conn. 2072-X, from Home Guild Ind., 415 Lexington Ave., New York, N. Y. Base Bid **(1) $750,000. (2) $744,000.** CD 8/7.

†Conn., Windsor Locks—Federal Works Agency, Wash., D. C., Aug. 4, 85 dwelling units, Project Conn. 6081-X, from Karl Jackson, 214 High St., Boston, Mass. **$302,298.** CD 7/31.

†Ga., Athens—Pub. Bldgs. Administration, Wash., D. C., July 29, post office (except elevator), from A. Farnell Blair, Decatur, Bids **(1) $364,419 (2) $366,419.** CD 7/3—ENR 7/10.

★**Ill., East St. Louis**—St. Clair County Housing Auth., E. P. Griffin, chn., L. E. Davenport, dir., Spivey Bldg., Aug. 5, Samuel Gompers Homes Housing, Ill. 1-1, 33 buildings, 288 dwelling units, etc. and John Robinson Homes, Ill. 1-2, 18 buildings, 159 dwelling units, job complete, from MacDonald Constr. Co., 3829 W. Pine Blvd. and G. L. Tariton, Inc., 3615 Olive St., St. Louis, Mo., **$2,143,136*****general contract, from W. E. O'Neil Constr. Co., 2751 Clybourn Ave., Chicago, **$1,193,000*****plumbing and heating, from E. J. Maag, 333 N. 5 St., **$303,860*****electrical work, from Bradford Armature Works, 1015 Missouri Ave., **$60,368.** USHA. CD 7/10—ENR 7/17.

Mass., Brookline—Comrs. Norfolk Co., F. A. Leavitt, chn., County Court House, Dedham, Aug. 5, brick, granite court house, Washington St., from A. Piotti Co., 730 Dudley St., Dorchester. **$205,957.** CD 7/22—ENR 7/24.

★**†Mich., Detroit**—Detroit Housing Auth., 200 unit defense housing Project Mich. 20042-X, Nevada and Fenelon Aves., for USHA, from O. W. Burke Co., 1010 Fisher Bldg., Detroit. **$875,000.** CD 7/29.

★**†O., Cleveland** — National Advisory Com. for Aeronautics, E. R. Sharp, constr. administrator, Langeley Field, Hampton, Va., 1 story, 210x222 ft. technical-service building, from Schirmer-Paterson Co., 6830 Beaver Ave., **(a) $508,000. (b) $509,000.** CD 7/22—ENR 7/24.

★**†Pa., Chester**—Pub. Bldgs. Administration, Wash., D. C., 250 unit defense housing, Site 2, Delaware Co., from Nelson-Pedley, Inc., 12 S. 12 St., Phila. **$998,000.**

★**†Pa., Pittsburgh**—Allegheny Co. Housing Auth., Law & Finance Bldg., Aug. 5, Glen Hazel Heights defense housing, for FWA, from Starrett Bros., Inc., 8 S. Dearborn St., Chicago, Ill., **$3,894,983.** CD 7/30.

Pa., Pittsburgh—Pittsburgh Housing Auth., Dr. B. J. Hovde, in charge, Law and Finance Bldg., grading, for Arlington Housing, Proj. Pa. 104, Arlington Ave., from Hinman Bros. Constr. Co., Investment Bldg., **$357,500;** sewer and water lines, from McShane Constr. Co., 100 Baldwick Rd. **$108,890.**

★**†Va., Arlington**—Public Bldgs. Administration, Wash., D. C., temporary office buildings, from McClosky & Co., 1618 W. Thompson St., Phila., Pa. Base bid **(1) $1,552,700. (2) $1,877,900. (3) $2,096,600.**

†Va., Norfolk—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., Aug. 6, dispensary building, Norfolk Navy Yard, from M. Millimet & Assoc., 441 Lexington Ave., New York, N. Y. **$262,000.** CD 7/30.

CONTRACTS AWARDED

†Ala., Mobile—U. S. Eng., Federal Bldg., temporary housing, Brookley Field, to Algernon Blair, 1st Natl. Bank Bldg., Montgomery. **$155,969.**

†Calif., Bakersfield—Con. Q.M., temporary buildings, etc., to Franceschi Constr. Co., 465 Avila St., San Francisco. **$160,335.**

★**†Calif., Long Beach**—Yards & docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., 300 addn. duplex dwellings to house married listed personnel of Navy, Hill St. and Santa Fe Ave., to McNeil Constr. Co., 5860 Avalon Blvd., Los Angeles, **$2,000,000.**

★**†Conn., East Hartford** — Federal Works Agency, Wash., D. C., 500 dwelling units, defense housing, Laurel Park Heights, Conn 6024-X, to Cauldwell-Wingate Co., 101 Park Ave., New York, N. Y., **$1,853,144.** Bids 7/26. CD 7/30—ENR 8/7.

★**†Conn., Fairfield**—Federal Works Agency, Wash., D. C., 200 dwelling units, Conn. 6071-X, Knapps Hy., to A. E. Stephens Co., 1200 Main St., Springfield, Mass. **$784,450.** CD 7/31—ENR 8/7.

★**†Conn., New Britain**—New Britain Housing Auth., 200 dwelling units, Conn. 6032-X, Ellis St. and Rocky Hill Ave., for FWA, to M. Shapiro & Son Constr. Co., Inc., 254 West 54 St., New York, N. Y. **$848,100.** Bids 8/5. CD 8/7.

★**†Conn., Stratford**—Federal Works Agency, Wash., D. C., 400 housing units, Conn. 6061-X, Stonybrook Rd., to Wilaka Constr. Co., 384 E. 149 St., New York, N. Y. **$1,465,000.** Est. $1,400,000. CD 7/7.

★**†Ga., Atlanta**—Con. Q.M., motor base, (4th Echelon Motor Repair Base) warehouses, sheds, utilities, etc., to Central Contg. Co., 1st Natl. Bank Bldg., Atlanta, and Beckham & Brooks, Perry, **$2,529,778.** Robert & Co., Bona Allen Bldg., Engrs.

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

★†Ga., **Macon**—Macon Housing Auth., 250 defense housing for industrial workers, for USHA, to Beers Constr. Co., 70 Ellis St. N.E., Atlanta, **$665,000**; 100 units for Army Enlisted and Civilian Personnel at Army Basic Flying School, to R. A. Bowen, Macon, **$258,000.**

★†Ill., **Momence**—War Dpt., 20 St. and Constitution Ave, N. W., Wash., D. C., Central Ordnance Regulating Station, warehouses, magazines, 20 mi roads, 25 mi. railroads, miscellaneous buildings, utilities, etc., to Henry Ericsson Co., 228 S. La Salle St., Chicago, **$4,884,029.** Nimmons, Carr & Wright, 33 N. Michigan Ave., Chicago, Archts. and Engrs. CD 8/1—ENR 8/7.

†Ind., **Fort Benjamin Harrison**—Con. Q.M., motor repair shops, oil house, to Pearson Constr. Co., Inc., Benton Harbor, Mich. **$73,995.** CD 8/4—ENR 8/7.

†Ky., **Fort Knox**—Con. Q.M., vehicle sheds, utilities, to H. J. Steilberg & Son, Valley Station. **$64,900.**

★†Md., **Baltimore** — Revere Copper & Brass, Inc., 235 Park Ave., New York, N. Y., 1 story Tube Mill, to James Stewart & Co., 230 Park Ave., New York, N. Y., **$1,396,000** for building and land. Total est. $3,100,000. Defense Plant Corp. will finance. CD 8/7.

★†Md., **Edgewood**—Con. Q.M., Edgewood, 3 story, 58x730 ft., brick, steel technical office building chemical warfare, Edgewood Arsenal, to Cummins Constr. Co., 803 Cathedral St., Baltimore. **Est. $1,500,000.**

★†Mass., **Hingham**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., expansion facilities, Naval Ammunition Depot, Contr. Y-4961, to T. Stuart & Sons Co., 70 Phillips St., Watertown, N. Y., **$2,600,000.** CD 7/21—ENR 7/24.

†Mich., **Detroit**—Vickers Inc., 1400 Oakman Blvd., 1 story, 200x260 ft., brick, steel, concrete factory, to Brown & Matthews, Inc., 122 E. 42 St., New York, N. Y. **$200,000.** Defense Plant Corp. will finance. CD 6/25—ENR 7/3, under Industrial Bldgs.

Minn., Willmar—E. H. Brogren, clk., municipal light and power plant imprvs., incl. electric switching and control equip., etc., to Westinghouse Electric & Mfg. Co., 20 N. Wacker Dr., Chicago, Ill. **$85,555.** Bids 7/14. CD 6/25—ENR 7/3.

★†Mo., **St. Louis**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., armor piercing core plant addn., to Fruin-Colnon Contg. Co., 520 Merchants Laclede Bldg., **$1,725,000.** Total est. $6,141,000 incl. equip. McQuay-Norris Mfg. Co., 2320 Marconi St., will operate, on cost-plus fixed fee basis.

Nev., Reno—University of Nevada, 1 story, 170x224 ft., steel frame, rein.-con. gymnasium, to M. R. Peterson, 1116 O St., Sacramento, Calif., **$359,319.** Bids 8/2. CD 6/24—ENR 6/26.

★†N. J., **Fort Monmouth**—War Dpt., 20 St. and Constitution Ave. N. W., Wash., D. C., initial portion antiaircraft detection and photographic laboratory, to Ehret-Day Co., 601 Mattison Ave., Asbury Park, **$735,000.** Total est. $1,270,000.

†N. J., **Raritan**—Con. Q.M., shipping and receiving depot, Raritan Arsenal, to Slonk Constr. Co., 32 Decker Ave., Elizabeth. **$87,432.**

†O., **Fairfield**—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., temporary housing, Patterson Field, to George W. Timmons, 1293 E. Broad St., Columbus. **$345,037.** CD 5/27—ENR 6/5.

†Okla., **Fort Sill**—Con. Q.M., remodeling mobilization buildings, to Homer A. Parks, 4568 Roland St., Dallas, Tex., **$171,800.**

★†Pa., **Etna**—Federal Works Agency, Wash., D. C., 250 unit defense housing, to Madsen Constr. Co., 1790 Lyndale Ave., and Maurice Schumacher, 438 Baker Bldg., Minneapolis, Minn., **$1,008,091.** CD 5/28—ENR 6/5.

†R. I., **Newport**—Coast Guard Div., Treas. Dpt., Wash., D. C., 2 story, 42x72 ft. and 35x52 ft. dwelling-equipment bldg., accessories, Castle Hill Coast Guard Station, to Joseph E. Bennett Co., 91 Newbury St., Boston, Mass. **$107,450.**

Tex., College Station—A & M College, E. N. Holmgreen, bus. mgr., power plant unit, to General Electric Co., 1801 N. Lamar St., and Westinghouse Electric Co., Insurance Bldg., both of Dallas. **$126,400.** Bids 6/25.

†Tex., **Brownwood**—Con. Q.M., Camp Bowie, motor repair shop, to Eckert-Fair Constr. Co., Liberty Bank Bldg., Dallas, and c/o Camp Bowie. **$38,138.**

★†Tex., **Camp Barkley**—War Dpt., 20 St. and Constitution Ave., N. W., Wash., D. C., replacement center, 170 buildings, and utilities to house officers and enlisted men, for medical corp, to A. J. Rife Constr. Co., 2803 Maple Lawn Rd., Dallas, Tex., **$2,036,972.**

★†Tex., **Fort Worth**—War Dpt., 20 St. and Constitution Ave., Wash., D. C., Quartermasters' Depot, incl. warehouses, shops, garages, gas and oil storage, sentry block, checkers office, 2 mi. fencing, utilities, etc., to Harry B. Friedman, 1510 W. 10 St., 4¼ mi. south of here. **$1,627,490.** CD 8/6.

†Tex., **Palacios**—Con. Q.M., Camp Hulen, 64 temporary 1 and 2 story buildings, motor repair shops, storage rooms, hospital, recreation, barracks, etc., to Steele & Co., Inc., 1st Natl. Bank Bldg., Houston, **$369,890.**

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†Utah, Ogden—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., Radio Repair and Signal Corps warehouse, Hill Field, to John H. Haslam, 4212 Highland Dr., Salt Lake City. **$168,102.** Bids 7/8. CD 7/2.

★**Va., Richmond**—Richmond Housing Auth., W. S. Meacham, Chn., Gilpin Court Housing Proj. Va 701, to Laburnum Constr. Corp., 918 E. Main St., **$1,027,400.** Bids 8/5. CD 8/7, under LB—ENR 7/17.

†Wash., Fort Lewis—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., additional Third Echelon shops, facilities and electric distr. extens. and service connections, Inv. 6105-42-6, to S. Bergesen, Box 83, Route 1, South Tacoma. **$88,400.**

Ont., Frankford—Wartime Housing Ltd., 55 York St., Toronto, 100 bungalows, to Hill-Clark-Francis, Ltd., New Liskheard. About **$200,000.**

Ont., Hamilton—Wartime Housing, Ltd., 55 York St., Toronto, 200 bungalows, to W. H. Yates Constr. Co. Ltd., 400 Wellington St. About **$400,000.** Bids 7/25. CD 7/22.

Que., Huberdeau—Reverand Freres de la Misericorde, Huberdeau, orphanage, to Dansereau, Ltd., 1387 Bernard Ave. W., Montreal, about **$250,000.** E. Larose, 1480 Blvd. St. Joseph E., Montreal, archt. CD 6/16—ENR 6/19.

Que., Valleyfield—Wartime Housing Ltd., 55 York St., Toronto, Ont., 150 house, Salaberry Island, to H. F. McLean, Ltd., c/o Dominion Constr. Corp. Ltd., 217 Bay St., Toronto, Ont., about $325,000. CD 7/21.

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Vallejo—Fox-West Coast Theatres, Inc., 988 Market St., San Francisco, rein.-con., steel theatre. **$165,000.**

Conn., Hartford—Mt. Sinai Hospital, 119 Capitol Ave., plans by Ebbets & Frid, 15 Lewis St., 4 story, bsmnt. 40x135 ft. brick, steel, concrete hospital addn., alterations, Blue Hills Ave. $250,000.

Md., Westminster—Western Maryland College, Westminster, plans by O. Eugene Adams, 329 N. Charles St., Baltimore, boy's dormitory, infirmary and library exten. $200,000.

Mich., Bloomfield Hills—Cranbrook Foundation, Lone Pine Rd., plans being completed by Eliel Saarenin, 1 Cranbrook Rd., 1 story, brick, steel, stone science bldg. $150,000.

Mich, Pontiac—First Baptist Church, plans by W. C. Zimmerman, 838 Ricker Bldg., 1 and 2 story bsmnt., brick, steel, concrete, stone, church, plain fdn. $250,000.

Nev., Las Vegas—First National Bank of Nevada, Las Vegas, plans by Capitol Co., 625 Market St., San Francisco, Calif., rein.-con. bank and office bldg. $150,000.

N. J., Phillipsburg — Warren Hospital, W. Dumont, chn. in charge, 3 story, bsmnt., brick, steel, concrete, hospital addn. $150,000.

N. Y., Forest Hills — Cornell Developing Corp., 16 Court St., Brooklyn, plans by P. Birnbaum, 303 W. 42 St., New York, 6 story apartment, 104-21 68 Dr. **$385,000.**

★**O., Avon Lake**—Carl and Harvey Yoder, 5500 Walworth Rd., Cleveland, five hundred 27x28 ft., brick, frame houses. **$3,000,000.**

O., Willoughby—Peter O'Donnell, 19150 Renwood St., Cleveland, plans by Davis, De Marco & Smola, 5005 Euclid Ave., Cleveland, housing, single units, 26x26 ft., from E. 343 to E. 349 Sts. $250,000.

Pa., Clarion—L. H. Culbertson & F. Crooks, mgrs. and owners, Clarion, 3 story, bsmnt. hotel. $150,000.

★**Pa., Erie**—Smith & Root, Erie Trust Bldg., 100 residences. $500,000.

Pa., Lewistown—Owl's Club, Lewistown, plans by B. F. Whitman, Central Natl. Bank Bldg., York, 2 story, bsmnt. fraternity and clubhouse. $150,000

Pa., New Kensington—B. Dattola, New Kensington, plans by M. J. DeAngelis, 1401 Temple Bldg., Rochehster, brick, tile back up, steel theatre, 5 Ave. $150,000.

Pa., Pittsburgh—W. M. Neal, 928 N. Lincoln Ave., seventy-one 2 story, bsmnt., 22x33 ft., brick residences. $259,500.

★**Pa., Pottstown**—G. M. and M. W. James, West Lawn, 250 dwellings, on 20 acre tract, Berks and High Sts. **$750,000-$1,000,000.**

R. I., Newport—United Service Organization, M. Levy, Daily News Bldg., for USO bldg., recreation facilities, amphitheater, brick. $160,000.

S. C., Greenville—Cleveland Place Homes, Inc., c/o M. C. Davenport, 48 housing units, University Ridge between Jones Ave. and McDaniel St. **$200,000.**

Tex., Houston—Holland Lodge A.F. and A.M., Main and McKinney Sts., plans by L. Cato, 500 Stuart St., 4 story, fireproof lodge hall and store building, Main and Pierce Sts. $175,000.

PROPOSED WORK

Bids Asked August 21

N. Y., Far Rockaway—Brooklyn Jewish Home for Convalescents, Inc., 130 Clinton St., Brooklyn, 1 story, conv[illegible]ent home o[illegible] Beach 9 St. **$175,000.** M[illegible] Weinstein, Court St., Brooklyn, archt. [illegible] 7/24.

LOW BIDDERS

Calif., Fresno—Pacific T[illegible] graph Co., Telephone Bldg[illegible] rein.-con. addns. for phone Building Unit), from Fisher [illegible] Bldg., **$155,500.**

CONTRACTS AWARDED

Calif., South Gate—Krandi[illegible] Mortgage & In[illegible] vestment Co., 8933 Atlantic [illegible] frame dwellings. Owner builds. [illegible] **$250,000.**

Me., Brunswick — North[illegible] Corp., H. Shields, pres., [illegible] Harpswell St., to Chester S. [illegible] St., Melrose, Mass. **$225,000.** Hutchins & French, 11 Beacon St., Boston, Mass., archts.

Mass., West Springfield—Vincent Gallucci, 111 John St., New York, one hundred two-family five 1½ story, 24x30 ft., houses with garages, Tubbs Hill, to A. E. Stephens Co., 1200 Main St., Springfield. Est. **$400,000.** W. Lescaze, 211 E. 48 St., New York, archt.

Mich., Detroit—Nardin Park Methodist Church, 5151 W. Church Ave., c/o A. [illegible] Morrison, archt., 920 Fox Bldg., 2 [illegible] bsmnt., brick, stone, steel, rein.-con. [illegible] plain fdn. to Atkin Fordin Constr. Co., 2[illegible] W. Chicago Blvd. Est. **$150,000.** CD 11/24—ENR 11/21.

Mich., Midland — Owner, [illegible] Bennett, Straight, archts., Dearborn, theatre, to [illegible] Foster, Flint. **$300,000.**

★**N. Y., Brooklyn**—Dahill Associates, 2[illegible] E. 36 St., 200 one family homes, 14 acre tract, Dahill Rd. and Ft. Hamilton Parkway. Owner builds. **$1,500,000.** B. Dreisler, Jr., 163 Remsen St., archt.

N. Y., Flushing—Englishtown House, Inc., 163-18 Jamaica Ave., 42 one family homes, 7[illegible] Ave. and Veigh Pl. Owner builds. $235,000. A. E. Allen, 90-04 161 St., Jamaica, archt.

N. Y., Flushing—Kew Forest Properties, Inc., 141-36 71 Ave., 32 one family homes, 70 Rd. Owner builds. **$163,000.** A. H. Suzewitz, 37-60 82 St., Jackson Heights, archt.

★**N. Y., Flushing**—N. K. Winston & Co., Inc., 22 W. 48 St., New York, 260 one family homes, 164 St. and Oak Ave. separate contracts. **$1,250,000.** J. Unger, 39-01 Main St., archt.

N. Y., Forest Hills—Forest Hills Acres, Inc., 3505 Wayne Ave., New York, 40 one family homes, 64 Ave. and 98 St. Owner builds. **$180,000.** W. Sambur, 160-16 Jamaica Ave., Jamaica, archt.

N. Y., Forest Hills—Forest Hills Lakeview Homes, Inc., 3 Continental Ave., 30 one family homes, 110 St. 66 Ave. Owner builds. **$150,000.** S. M. Palm, 35-74 159 St., Flushing, archt.

★**N. Y., Hollis** — Woodland Manor, Inc., 163-18 Jamaica Ave., Jamaica, home development, 214 St. and Union Turnpike. Owner builds. **$525,000.** Initial group of [illegible] ultimately 150 homes. L. H. Maxon, 35[illegible] W. 34 St., archt.

N. Y., New York—Corporation of Roman Catholic Church of Good Shepherd of N. Y., 425 Madison Ave., altering 3 story school. Geo. A. Fuller Co., 497 Madison Ave. **$200,000.** CD 7/16—ENR 7/24.

O., Warren — Robins Amusement Co., masonry, carpentry and concrete work 1 story 80x160 ft. brick, steel, concrete commercial and theatre bldg., to Paramount Constr Co., 750 Prospect Ave. Est. **$200,000.** CD 7/[illegible]—ENR 3/20.

O., Youngstown—P. and M. J. Raful, Hopkins Rd., design and construction 2 story, 75x170 ft., brick, steel, concrete, terra cotta theatre, to F. & Y. Constr. Co., 328 E. Town St., Columbus, **$150,000.** Awarded 8/1.

Pa., Harrison Twp. (mail Natrona Heights) —W. Furer, Route 1, Harrison Twp., residences, to H. W. Woods (designer), Bull Creek Rd., RD 2, Tarentum, by day labor. **$250,000.**

Pa., Phila.—James F. Nolen & Son, 1715 Cheltenham Ave., residential development addn. Owner builds. **$425,000.**

★**Pa., Trafford**—Trafford Realty Co. of Trafford, J. G. Fullman, genl. mgr., south of 1st St., residences, separate contracts. **$1,000,000.**

★**Tex., Houston**—Clinton Park Development Co., c/o C. E. King, 7302 Kernel St., 200 unit housing, to Temple Lumber Co., 2400 Polk St. and L. L. Ray, c/o Heights Lumber Co., 425 W. 18 St. **$1,000,000.** Street and sewer work by owners. Total est. $1,350,000. T. A. Palmer, 7302 Kernel St., archt.

Tex., San Antonio—Home Owners Co., Huisache Ave., 40 or more frame dwellings, force account and sub-contract. **$160,000.**

Wash., Seattle—Balch & Setzer, E. 80 St. and 35 Ave. N.E., 62 frame houses, to J. Henrikson, 5701 Latona Ave. Est. **$225,000.**

Wis., De Pere—St. Norbert College, De Pere, 3 story, bsmnt., E-shaped, 67x190 ft., dormitory, to Hoffman Constr. Co., 1528 N. Appleton St., Appleton. Est. **$175,200-$200,000.** Bids 8/16. CD 6/11—ENR 6/19.

COMMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

Que., Loretteville—Rev. Sisters of Charity of St. Louis, Bienville, school, to E. Cote, 148 Lafayette St., Quebec City. **$159,000.** G. F. Caron, 88 Cote de la Montagne St., Quebec City, archt.

Que., Quebec City—D. E. Bennett, c/o G. McLeroy, archt., 729 Riverside Dr., Riverside, store, Charest Blvd., to Chrysanthe Jobin, Ltd., 182 Latourelle St., **$180,000.**

Que., Quebec City — Roman Catholic Parish of St. Esprit, 2nd Ave., church, to A. E. Bedard, 138 St. Patrick St. **$150,000.** A. Dufresne, 143 Royal Ave., Beauport, archt.

Que., Quebec City—Succession Louis Letourneau, c/o 37 de la Couronne St., 30 suite apartment, St. Cyrille and Belvedere Sts., to Francois Jobin, Incorp., 88 St. Louis Rd. **$162,000.** C. A. Jean, 2 Cote d' Abraham. archt.

INDUSTRIAL BUILDINGS

PROPOSED WORK

★**Ala., Gadsden**—BLAST FURNACE—Republic Steel Corp., E. I. Evans, genl. mgr., Gadsden, 800 ton blast furnace and battery of coke ovens. $10,000,000.

Ark., Magnolia (near El Dorado)—PLANT—Shell Oil Co., Eldorado, increasing capacity Casinghead Plant from 15,000,000 to 20,000,000 ft. daily. $200,000.

Calif., Modesto—PLANT—Modesto Foundry, Inc., rebuilding plant destroyed by fire. $40,000 or more.

Calif., Oakland — WAREHOUSE — G. J. Kruse, 209 Jefferson St., warehouse. $45,000.

Calif., Sacramento—PLANT—Globe Mills, 1701 Montgomery St., San Francisco, plant expansions, 42 rein.-con. grain elevators, 32 rein.-con. grain bins. $250,000.

Calif., San Diego — EXPERIMENTAL PLANT—Consolidated Aircraft Corp., 3302 Pacific Hy. soon lets contract, 200x325 ft. experimental addn. building. Over $50,000. Taylor & Taylor, 803 W. 3 St., Los Angeles, archts. and engrs.

Conn., Bridgeport — PLANT — Bridgeport Herald Corp., 299 Lafayette St., plans by W. Ginsberg, 331 Madison Ave., New York, 2 story, 100x105 ft., brick publishing plant addn., Lafayette St. Over $40,000. CD 7/23—ENR 7/31.

Md., Fort Geo. G. Meade—FREIGHT STATION, etc.—Baltimore & Ohio R.R. Co., B and O. Bldg., Baltimore. C. W. Van Horn, vice pres. soon lets contract, freight and passenger station exten., trucking loading platforms, addition storage shed. $40,000.

Mass., Quincy—BOTTLING PLANT—Coca Cola Bottling So., 44 Federal Ave., 1 story, brick, steel, concrete bottling plant, Southern Artery, Field St. $50,000-$75,000. J. M. Shelton, Bona Allen Bldg., Atlanta, Ga., engr.

Mich., Detroit—FACTORY—Awrey Baking Co., 5219 Tierman Ave., plans by N. Krecke, 1346 Broadway Ave., brick, steel, rein.-con. bakery plant factory addn., plain fdn. About $45,000.

Minn., Warroad—GENERATING PLANT—Border Counties Power Co-operative, F. H. Timm, atty., Warroad, generating plant. $175,000 REA allot. General Eng. Corp., 2944 Cedar Ave., Minneapolis, engrs. CD 7/31—ENR 8/7.

N. Y., Flushing—STORAGE, etc.—G. W. Averill, 33 Howard St., Oceanside, plans by A. R. Fritz, 150 Forest Ave., Rockville Centre, 1 story, storage and business building. $40,000.

★**Nev., Arden** — PLANT — Blue Diamond Corp., 1650 S. Alameda St., Los Angeles, Calif., completed plans wallboard manufacturing plant. $500,000. Steel awarded to Consolidated Steel Corp., Slausson and Eastern Aves., Los Angeles, Calif.

Pa., Erie—FACTORY—Lord Mfg. Co., T. Lord, genl. mgr., 1635 W. 12 St., 1 story brick, steel, concrete, glass block factory. C. D. Robins, engr., 12 St., in charge construction.

Pa., Shillington — BOILERHOUSE — Fairy Silk Mills, E. S. Jenckes, in charge, Shillington, boiler house addn. $40,000.

Pa., Wyoming—FACTORY—Nelson Bros., 36 S. Baltimore St., Wilkes Barre, factory. Over $150,000.

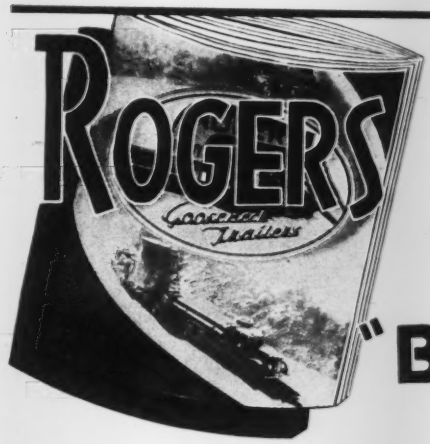
Wis., Green Bay—POWER PLANT—Wisconsin Pub. Serv. Comn., Bellen Bldg., soon lets contract, superstructure 82x176 ft., concrete, steel, brick, power plant. Public Utility Eng. & Service Co., 231 S. La Salle St., Chicago,

Wis., Washington Island—GENERATING PLANT—Washington Island Electric Co-operative, Inc., Washington Island, generating plant. $51,000 REA allot.

★**Tex., Freeport** — PLANT — Dow Chemical Co., Freeport, ammonia plant addn. $3,500,000, also collecting pipelines sys. to tap natural gas wells, 125 mi. radius, etc. $1,000,000.

Wash., Sunnyside — FREEZING PLANT — Sunnyside Ice & Produce Co., quick freeze plant, to replace one destroyed by fire. $40,000.

Wis., Milwaukee — FACTORY — Owner, c/o R. A. Satherland, archt., 259 E. Wells St., 2 story, 75x176 ft., brick, rein.-con. factory.



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BIDS ASKED

Bids Asked August ...

Pa., Pittsburgh—MANUFA...CHING, etc. —Prack & Prack, archts., M... Bldg., No. 6 story, bsmnt., brick, steel, ...concrete manufacturing building and boiler ...use, for Mine Safety Appliances Co., J. T. ...son, pres., 200 Braddock Ave.

Bids Asked About Aug... 22

Ont., Brantford—OVENS, ...—Prack & Prack, archts., 36 James St. S., Hamilton, 100x250 ft., brick steel drying ...ens, 40x40 ft. boiler house for Canadian Dixie Abrasive, J. D. MacKenzie, genl. mgr., Canal St., $50,000.

Bids Asked

Calif., Los Angeles—MARKET—S. Clemens, archts., 1135 Van Nuys Bldg., 2 intermediate floors, bsmnt., 125x235 ft., rein.-con. market, La Brea Ave. between 2 and 3 Sts., for E. J. Howard, 11700 Natl. Blvd. W. $50,000.

Calif., San Leandro—FACTORY—W. H. Ellison, engr., Pacific Bldg., San Francisco, 1 story, 320x600 ft., rein.-con. factory, for National Automotive Fibres, Inc., Railroad Ave., and Kennedy St. $300,000.

Pa., West York (York P. O.)—PLANT—B. F. Whitman, archt., Central Natl. Bank Bldg., York, 1 and 2 story, 42x78 ft. brick, concrete dairy plant, Adams and Orange Sts., for Yuengling Dairy Products Corp., Pottsville. $40,000.

CONTRACTS AWARDED

Calif., Berkeley—WAREHOUSE—California Ink Co., 711 Camellia St., 1 story warehouse to E. T. Leiter & Sons, 811-37 St., Oakland, **$42,300.**

Calif., Fresno—PLANT——G. N. Hilburn, archt., 1211 K St., Modesto, 1 story, wood frame, concrete packing plant, to J. T. Cowan, 538 Brix Bldg., for Western Turkey Packing Co., c/o archt. CD 7/30—ENR 8/7.

Calif., Los Angeles—PLANT—W. P. Fuller & Co., 135 N. Los Angeles St., 1 story, 125x415 ft., corrugated metal exten. walls, piers, concrete fdn., concrete loading docks, etc., to Myers Bros., 3407 San Fernando Rd. Est. over **$40,000.** CD 7/2—ENR 7/17.

Calif., Oakland — WAREHOUSE — E. B. Field Co., 365 15 St., warehouse addns. to J. J. Moore Co., 354 Hobart St. **$40,000.** R. H. Cooley, 354 Hobart St., engr.

Calif., Oakland—FACTORY—Zenith Furniture Mfg. Co., 81 Ave., 1 story, brick factory addns. to J. J. Moore Co., 354 Hobart St. **$45,000.** R. H. Cooley, 354 Hobart St., engr.

Calif., San Francisco—REFRIGERATION—K. Theill, eng., 580 Market St., 1 story, rein.-con. refrigeration building, for Safeway Stores, Inc., 1000 Brannan St., to Cahill Bros., 206 Sansome St. **$60,000.** CD 7/28—ENR 7/31.

Calif., San Francisco — FACTORY — Tiedemann & Harris, c/o contractors, factory-warehouse addn., to F. J. Early, Jr., 368 Pine St. **$55,000.**

Conn., Bridgeport — PLANT — Remington Rand, Inc., 1087 Railroad Ave., brick, steel plant addn., to Harry Maring, Jr., Inc., 38 Lindley St., Bridgeport. Est. **$100,000.** CD 7/23—ENR 7/31.

La., New Orleans—MARKET—Office Jones, Roessle & Olschner, archts., Maison Blanche Bldg., brick, steel supermarket, grocery store, to Perrilliat-Rickey Constr. Co., S. Rendon and Eve Sts., for Capitol Stores, Inc., 2654 St. Louis St. CD 7/22—ENR 7/24 under Commercial Bldgs.

Me., South Portland — STORAGE — South Portland Shipbuilding Corp., 2 story, 30x35 ft. frame administration bldg., 1 story, 21x22 ft. gate house, 1 story, 75x450 ft. storage, 1 story, 15x42 ft. welding bldg., 1 story, 75x450 ft. assembly plant, etc., to E. C. Snodgrass, 160 Front St. Est. **$125,000.** A. J. Harriman, Box 2206, engr.

Mich., Wyandotte — WAREHOUSE — Firestone Tire Co., Wyandotte, 1 story, 250x350 ft., brick, steel, concrete warehouse, plus fdn., to J. A. Utley Co., 723 E. Ten Mile Rd., Royal Oak. Est. **$150,000.** Russell Eng. Co., 607 Shelby St., Detroit, engrs.

Minn., Albert Lea—BOTTLING PLANT—Coca-Cola Bottling Co., Albert Lea, general contract 1 story, bsmnt., 66x132 ft., brick, hollow tile bottling plant, to R. W. Scott & Co., Albert Lea. **$49,852.** Bids 7/31.

Mo., St. Louis—PLANT—Krey Packing Co., 2100 Bremen Ave., 2 story, plant and loading dock addns., to Woermann Constr. Co., 2500 W. Pine Blvd. Est. **$40,000.**

Mo., St. Louis—STORAGE, etc.—Carter Carburetor Co., 2840 N. Spring Ave., 3rd and partial 4th floor addn. to 1 story receiving and storage building, St. Louis Ave., to L. O. Stocker Co., Arcade Bldg. Est. **$150,000.**

Mo., St. Louis — FACTORY — Nixdorf-Krein Mfg. Co., 916 Howard St., 2 story, 33x35 ft. brick, rein.-con. factory addn. to Frum-Colvin Contg. Co., 502 Merchants-Laclede Bldg. Est. **$40,000.** E. Littmann, c/o owner, archt.

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INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

N. Y., Brooklyn—ICE STORAGE PLANT—Cirillo Bros. Ice Corp., 1327 38 St., ice storage plant, Smith St., separate contracts. **$55,000.** Lama & Proskauer, 383 Pearl St., archts. CD 4/10—ENR 4/17.

N. Y., Long Island City—FURNACE—Phelps Dodge Copper Products Corp., 40 Wall St., New York, furnace building exten., Meeker Ave. bridge, to Brown & Matthews, Inc., 122 E. 42 St., New York. Est. **$150,000.**

★**N. J., North Bergen**—FACTORY, etc.—E. J. Kahn and R. A. Jacobs, archts., 2 Park Ave., New York, 1 and 2 story, bsmnt., 300x800 ft., brick, steel factory and office bldg., for Grand City Container Corp., 622 W. 57 St., New York, to Brown & Matthews Inc., 122 E. 42 St., New York. Est. **$750,000.** CD 6/20—ENR 6/26.

O., Cleveland — STORE ROOMS, etc. — Exella Amusement Co., E. 21 St. and Payne Ave., 1 story, 65x165 ft. brick, steel, concrete, store rooms and theater bldg., to Nicholas Pavle 10518 Joan Ave. Est. **$150,000.** P. Matzinger, Empire Bldg., archt.

O., Cleveland—FACTORY—Pipe Mchy. Co., W. L. Benninghoff, pres., 930 E. 70th St., 1 story, 82x110 ft. and 25x80 ft. brick, steel, factory, to Masters & Mullen Constr. Co., Chester Twelfth Bldg., **$50,000.** Awarded 8/4. N. Sawdy, c/o owner, engr.

O., Clevealnd—FACTORY—Tinnerman Products Co., A. H. Tinnerman, pres., 2038 Fulton Rd., design and construction 1 story 56x150 ft., brick, steel, factory addn., to Austin Co., 16110 Euclid Ave. Est. **$40,000.** Awarded 8/4.

O., Cleveland—FACTORY—J. C. Ulmer Co., J. C. Ulmer, pres., 1791 E. 38 St., 1 story, 90x100 ft., brick, steel factory addn., to J. L. Hunting Co., Ninth and Chester Bldg. Est. **$40,000.** Awarded 8/4. W. H. Hatch, Hippodrome Bldg., engr.

O., Wickliffe—TRANSFORMER STATION—Cleveland Electric Illuminating Co., W. H. Hartman, purch. agt., 45 Public Square, 1 story, 32x65 ft. brick, steel, concrete, electric transformer sta., to Hunkin-Conkey Constr. Co., 1740 E. 12 St., Cleveland. Est. **$40,000.**

Ore., Eugene—PLANT—Pacific Telephone & Telegraph Co., R. B. Bacon, dist. mgr., 3 story, bsmnt. 34x34 ft. on Oak St. wing, telephone bldg., 10 and Oak Sts., to Robertson, Hay & Wallace, 1801 SE Grand Ave., Portland. Est. **$185,000.** A. E. Doyle & Assoc., Pacific Bldg., Portland, archts. CD 8/21/40—ENR 8/29/40.

Pa., Allentown—PLANT—Heilman Boiler Wks., 110 Linden St., 1 story, steel, concrete plant unit, Linden St. Owner builds and separate contracts. Over **$40,000.**

Pa., Allentown—FREIGHT—Terminal, Inc., 443 N. Maxwell St., 1 story, 50x200 ft., freight interchange building, separate contracts. **$40,000.**

Pa., Austin—PLANT—Veda Mines, Inc., Tulluride, Colo., H. K. Williamson, genl. mgr., Austin, plant repairs, extens., addns., own forces and separate contracts. **$75,000-$100,000.**

Pa., Cornwells Heights—FACTORY—Pennsylvania Salt Co., Widener Bldg., Phila., design and construction plant, to Austin Co., Commercial Trust Bldg., Phila. Est. over **$50,000.** CD 7/30.

Pa., Phila.—FACTORY—General Electric Co., Elmwood Ave., factory alterations, to Belmont Iron Wks., Washington Ave. Est. **$50,000-$75,000.**

Pa., Pittsburgh — WAREHOUSE — Francis H. Leggett & Co., Galveston and Bowater Sts., general contract warehouse exten., to Rose & Fisher, 3125 McClure Ave., N.S. Est. **$40,000.** J. McWilliams, Negley Bldg., archt.

Pa., Warren—WAREHOUSE, etc.—New Process Co., J. L. Blair, pres., 220 Hickory St., general contract altering 3 story, bsmnt. warehouse and understreet connecting tunnel, to Gamble Bldg. Corp., Liberty St.

R. I., Providence—FREIGHT TERMINAL, etc.—Bristol Terminal Inc., c/o O. DiSaia, archt., 703 Gardner Bldg., 1 story, 106x171 ft., brick, cinder block, freight terminal and shed, to A. C. Constr. Co., 156 Jastram St. Est. **$50,000.** CD 4/17—ENR 4/24.

★**Tex., Fort Worth**—STORAGE BINS, etc.—Burrus Mill & Elevator Co., J. Paul Smith, mgr., Colorado Gulf Hy., storage bin expansion program, warehouse, etc. Owner builds. Est. **$500,000.**

Tex., Sherman—WAREHOUSE——Interstate Cotton Oil & Refining Co., Sherman, 2 story, 115x183 ft., concrete, steel, hollow tile warehouse, to Wood & Elliott, Sherman, approx. **$43,600.** CD 7/8—ENR 7/10.

Wis., Colby—GARAGE—Kriplean Bros., general contract 1 story, 60x199 ft., brick steel, concrete garage to E. Boson, 305 Concord St., Marshfield. D. Hougen, 132 E. Grand Ave., Wisconsin Rapids, archt.

Wis., Mt. Pleasant—WAREHOUSE—J. I. Case Co., 700 State St., Racine, 1 story, part bsmnt., 241x447 ft. and 51x136 ft. warehouse addn., to Nelson & Co., Inc., 1550 Yont St., Racine. Bids 7/17. CD 7/15—ENR 7/17.

Wis., Port Edwards — WAREHOUSE — Nekoosa-Edwards Paper Co., general contract 1 story, 50x200 ft., brick, steel, concrete warehouse, remodel bldg. for recreation center, to Frank Henry, 1120 S. 6 St., Wisconsin Rapids.

Wis., West Allis (br. Milwaukee)—GALLERIES—Allis-Chalmers Mfg. Co., 1126 S. 70 St., galleries in Shop 3, to Meredith Bros., Inc., 121 E. Washington St., Milwaukee. Est. **$40,000.** C. E. Meyer, c/o owner, engr.

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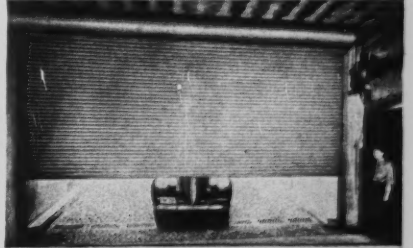

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OFFICIAL PROPOSALS

RATE: THE RATE FOR OFFICIAL PROPOSAL ADVERTISING IS 50 CENTS PER LINE (OR FRACTION) PER INSERTION
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SEND COPY TO OFFICIAL PROPOSAL DIVISION, ENGINEERING NEWS-RECORD, 330 W. 42ND ST., NEW YORK, N. Y.

Bids: August 20 (488)

Water Mains and Sewers

WASHINGTON SUBURBAN SANITARY COMMISSION
CONTRACT 135-W & S

Sealed proposals for constructing approximately 570 feet of 6-inch, 2,120 feet of 8-inch and 1,585 feet of 10-inch cast iron water mains and 1,735 feet of 8-inch, 395 feet of 10-inch and 865 feet of 12-inch vitrified pipe sewers on Contract 135-W & S will be received at the office of the Washington Suburban Sanitary Commission, Owens Avenue, Hyattsville, Maryland, until 3:30 P. M., Eastern Standard Time, Wednesday, August 20, 1941, at which place and time they will be publicly opened and read.

Plans and specifications may be obtained from Harry R. Hall, Chief Engineer of the Commission, Hyattsville, Maryland, upon deposit of $5.00, which deposit will be returned to bidders, or to those returning plans and specifications in good condition.

Perry Boswell
J. Donald Clagett
Frank B. Smith
Commissioners

Bids: August 27 (485)

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
ALBANY, N. Y.

Sealed proposals will be received by the undersigned at the State Office Building, 13th Floor, Albany, N. Y., until one o'clock p.m., advanced standard time, which is twelve o'clock noon, eastern standard time, on WEDNESDAY, AUGUST 27, 1941, for the following highways, bridges and railroad grade crossing elimination projects:

County	Deposit for plans	Bid deposit	Type	Miles
			CONSTRUCTION	
Cortland	$5	$800	16' Gravel Found	0.55
			RECONSTRUCTION	
Delaware	5	15,000	22' Concrete 8"-7"-8"	2.97
Essex & Clinton	10	18,500	22' Conc. 8" 19' Bit. Mac. M.M. Opt	3.45
Jefferson	10	15,000	24' Conc. 8" 100 Girder Bridge	4.29
Madison & Oneida	10	18,000	46' Concrete 8"	2.58
Steuben	5	5,000	170' Truss Bridge 24' Concrete 8"-7"-8" Appr	0.27
			RAILROAD GRADE CROSSING ELIMINATION	
Chenango	5	11,000	Two 100' & One 57½' Girders; Four 45' I-Beams elimination structs. 22' Bit. Mac. M.M. Opt. Appr	0.56

Maps, plans, specifications, and estimates may be obtained at the office of the Division of Highways, Albany, N. Y., and at the office of the District Engineers in whose districts the projects are located. The names and address of the District Engineers and counties in their district will be furnished upon request and may be seen at the office of the State Department of Public Works, State Office Building, Worth and Center Streets, New York City.

The deposit for Plans and Proposal Forms for each contract containing 1 to 15 sheets is $5.00; 16 to 30 sheets, $10.00; over 30 sheets, $20.00. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specifications, and contract agreement, and to the special provisions applying to projects financed with federal funds.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompained by cash, draft or certified check payable to the order of "State of New York, Division of the Treasury," for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instructions to Bidders."

When optional types are permitted on contracts with federal funds, bidders must state in the space provided in the proposal the exact designation of the optional type upon which the proposal is predicated.

Minimum wage rate per hour for above work shall be as follows:

County	Skilled Labor	Intermediate Grade Labor	Unskilled Labor
Chenango	(Labor rates will be found in proposal form).		
Clinton	$.75	$.55	$.50
Cortland	.75	.55	.50
Delaware	.75	.55	.45
Essex	.75	.55	.50
Jefferson	.75	.55	.55
Madison	.75	.60	.60
Oneida	.75	.60	.60
Steuben	.75	.55	.50

UNLESS SHOWN OTHERWISE IN THE ITEMIZED PROPOSAL FOR EACH PROJECT.

The right is reserved to reject any or all bids.

A. W. BRANDT
Supt. of Public Works

Bids: August 28 (492)

Fabricated Structural Steel

CITY OF CHICAGO
STATE STREET SUBWAY AND DEARBORN STREET SUBWAY.
FURNISHING AND DELIVERING FABRICATED STRUCTURAL STEEL FOR CONNECTIONS WITH CHICAGO RAPID TRANSIT LINES.

Sealed bids, endorsed "PROPOSAL FOR FURNISHING AND DELIVERING FABRICATED STRUCTURAL STEEL," will be received by the City of Chicago, in the County of Cook and State of Illinois, at the office of the Commissioner of Subways and Superhighways, Room 1940, 20 N. Wacker Drive, Chicago, Illinois, until 1 o'clock P.M., Central Standard Time, (being 2 o'clock P.M. Chicago Daylight Saving Time), on Thursday, August 28th, 1941 at which place and time all such proposals will be opened publicly and read aloud by a representative of the Commissioner of Subways and Superhighways.

The work for which such proposals are invited consists of furnishing, fabricating, painting and delivering structural steel and the performing of miscellaneous work appurtenant and collateral thereto, as specified in the Contract Documents and shown on the plans. The fabricated structural steel is to be delivered, F.O.B. trucks, to the respective sites of 3 incline structures which are to be built under other contracts and which are to connect subway structures with elevated track structures of the Chicago Rapid Transit Company as shown on the plans. Said incline structures are to be built near E. 13th Street and S. State Street, near W. Willow Street and N. Sheffield Avenue, and near N. Hermitage Avenue and W. Ellen Street, all in the City of Chicago, as described in more detail in the Requirements for Bidding and Instructions to Bidders.

All bids must be made upon blank forms of proposal as furnished by the Commissioner of Subways and Superhighways and included in the Contract Documents, and shall be made in accordance with the provisions contained in said documents.

The successful bidder will be required to furnish, execute, and deliver to the Commissioner of Subways and Superhighways, a performance bond satisfactory to the Commissioner of Subways and Superhighways in the amount and within the period of time set out in the Contract Documents.

The Contract Documents, including Standard Specifications for Subway Construction, Contract Requirements and Contract Plans, are on file and available to bidders at the office of the Commissioner of Subways and Superhighways at Room 1940, 20 N. Wacker Drive, Chicago, Illinois. Copies of the Contract Documents may be obtained by depositing Twenty-five Dollars ($25.00) with the Commissioner of Subways and Superhighways, for each set of documents. The amount of the deposit for one set of documents will be refunded to each actual bidder who returns the said documents in good condition within ten (10) calendar days after the opening of bids. Fifteen Dollars ($15.00) will be refunded for each of all other sets of documents so returned.

The Commissioner of Subways and Superhighways has issued a "Standard Specifications for Subway Construction," dated February, 1940. A copy of these specifications will be issued to each prospective bidder obtaining copies of the Contract Documents.

The Commissioner of Subways and Superhighways (formerly the Commissioner of Subways and Traction) has issued a "Manual of Paints and Other Coatings for Subway Structures" pertaining to certain work required under the contract. The original and copies thereof are on file at the office of the Commissioner and are available for examination by prospective bidders.

Each proposal must be accompanied by cash or a certified check drawn on some responsible bank doing business in the City of Chicago, in the amount of Eight Thousand Dollars ($8,000.00) payable to the order of the City of Chicago. Any proposal submitted without being accompanied by such cash or certified check may be considered informal and consequently may be rejected.

The City of Chicago reserves the right to reject any or all bids and to disregard any informalities in the bids and bidding.

No bid may be withdrawn, after the scheduled closing time for receipt of bids, for at least forty-five (45) calendar days.

CITY OF CHICAGO,
By PHILLIP HARRINGTON,
Commissioner of Subways and Superhighways.
Chicago, Illinois, August 14, 1941.

Bids: August 20 (487)

Water Main Construction

WASHINGTON SUBURBAN SANITARY COMMISSION
CONTRACT 134-W

Sealed proposals for constructing approximately 28 feet of 6-inch, 68 feet of 8-inch, 28 feet of 10-inch and 7,410 feet of 24-inch cast iron water mains on Contract 134-W will be received at the office of the Washington Suburban Sanitary Commission, Owens Avenue, Hyattsville, Maryland, until 3:00 P. M., Eastern Standard Time, Wednesday, **August 20, 1941,** at which place and time they will be publicly opened and read.

Plans and specifications may be obtained from Harry R. Hall, Chief Engineer of the Commission, Hyattsville, Maryland, upon deposit of $5.00, which deposit will be returned to bidders or to those returning plans and specifications in good condition.

Perry Boswell
J. Donald Clagett
Frank B. Smith

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